

## Installation Guide

# hp StorageWorks Modular Smart Array 1500 cs

Second Edition (March 2005)

**Part Number:** 355901-002

This document details the procedures for installing your Modular Smart Array 1500 Controller Shelf (MSA1500 cs) and its attached storage enclosures. This guide is a companion to the HP StorageWorks MSA1500 cs Configuration Overview poster, which is included in the shipping carton with this guide.



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Modular Smart Array 1500 cs Installation Guide  
Second Edition (March 2005)  
Part Number: 355901-002

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## About This Guide

This installation guide provides information about installing an MSA1500 cs, whether into an existing SAN or a new setup, and is organized as follows:

- Chapter 1: [Installation Procedures - All Deployments](#)
- Chapters 2 - 4: Configuration Procedures - for each Operating System

To use this guide, follow all of the instructions in Chapter 1 and then proceed to the chapter for your specific operating system, for some additional setup and configuration tasks.

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### Note:

- If a supplier is installing or configuring your MSA1500 cs, provide them with this guide and verify that they complete the information tables in "[MSA1500 cs Worksheets](#)" on page 85.
  - For information about having HP install and configure your MSA1500 cs, see "[Getting help](#)" on page 13.
  - Before configuring your MSA1500 cs, review the information in "[Step 1: Review and confirm your plans](#)" on page 17 and then proceed to "[Step 11: Configure your MSA1500 cs](#)" on page 53.
-

## Prerequisites

- Determine who will install and configure your MSA1500 cs.

A moderate level of knowledge about SANs and their components is required to install this storage array system.

If you are not familiar with installing and configuring storage array systems in a SAN, HP can install your MSA1500 cs for you. For more information, see “[Getting help](#)” on page 13.

- Complete the Planning Worksheet on the MSA1500 cs Configuration Overview poster.

The Configuration Overview poster is a companion to this Installation Guide and should be used to verify that you have all of the necessary and supported components for successfully installing your MSA1500 cs in your operating system environment.

- Become familiar with and periodically review the content on the MSA1500 cs web site at <http://www.hp.com/go/msa1500cs>.

- Go to the **Technical Documentation** page to locate and read the latest MSA1500 cs documentation, including the *MSA1500 cs Release Notes* (late-breaking and supplemental information about the MSA1500 cs), and the *HP StorageWorks MSA1500 cs Compatibility Guide* (important reference information and specifications).
- Go to the **Software, Firmware & Drivers** page to learn about recent firmware enhancements and support options for your operating system environment.

## Related documentation

In addition to this Installation Guide, the MSA1500 cs documentation set includes:

- *HP StorageWorks MSA1500 cs Configuration Overview* (printed)  
This poster illustrates common MSA1500 cs deployments and includes a checklist and worksheet for you complete, to help ensure that you have all of the items needed for your MSA1500 cs installation.  
The poster is a companion piece to this Installation Guide.
- *HP StorageWorks Modular Smart Array 1500 cs Maintenance and Service Guide*  
This guide contains basic information about using and managing the MSA1500 cs.
- *Command Line Interface Guide*  
This guide contains information about using the CLI.
- *HP StorageWorks Modular Smart Array 1000 Controller Reference Guide*  
This guide defines MSA1000 controller display messages and discusses other controller reference information.
- *HP Array Configuration Utility User Guide*  
This guide contains information about using the ACU.

These documents, and others, are available on the MSA1500 cs Documentation CD, included in the shipping carton with the MSA1500 cs, and on the **Technical Documentation** page of the MSA1500 cs web site at:  
<http://www.hp.com/go/msa1500cs>.

## Document conventions

The document conventions included in [Table 1](#) apply in most cases.

**Table 1: Document Conventions**

Element	Convention
Cross-reference links	<a href="#">Figure 1</a>
Key and field names, menu items, buttons, and dialog box titles	<b>Bold</b>
File names, application names, and text emphasis	<i>Italics</i>
User input, command and directory names, and system responses (output and messages)	Monospace font COMMAND NAMES are uppercase monospace font unless they are case sensitive
Variables	<monospace, italic font>
Web Site addresses	Underlined sans serif font text: <a href="http://www.hp.com">http://www.hp.com</a>

## Text symbols

The following symbols may be found in the text of this guide. They have the following meanings:



**WARNING:** Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or death.

---



**Caution:** Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

---

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**Note:** Text set off in this manner presents commentary, sidelights, or interesting points of information.

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## Equipment symbols

The following equipment symbols may be found on hardware for which this guide pertains. They have the following meanings:



Any enclosed surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

**WARNING:** To reduce the risk of personal injury from electrical shock hazards, do not open this enclosure.

---



Any RJ-45 receptacle marked with these symbols indicates a network interface connection.

**WARNING:** To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

---



Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. Contact with this surface could result in injury.

**WARNING:** To reduce the risk of personal injury from a hot component, allow the surface to cool before touching.

---



Power supplies or systems marked with these symbols indicate the presence of multiple sources of power.

**WARNING:** To reduce the risk of personal injury from electrical shock, remove all power cords to completely disconnect power from the power supplies and systems.

---



Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

**WARNING:** To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manually handling material.

---

## Rack stability

Rack stability protects personnel and equipment.



**WARNING:** To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
  - The full weight of the rack rests on the leveling jacks.
  - In single rack installations, the stabilizing feet are attached to the rack.
  - In multiple rack installations, the racks are coupled.
  - Only one rack component is extended at any time. A rack may become unstable if more than one rack component is extended for any reason.
-



## Getting help

If you have questions after reading this guide, contact an HP authorized service provider or access our web site at <http://www.hp.com>.

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**Note:** HP call centers use product and serial numbers to validate warranty entitlement. Most HP products can provide product number, serial number and firmware revision electronically through the use of supplied management or diagnostic utilities, eliminating the need to physically inspect or remove products from installed enclosures. You may be directed by HP to run these utilities to gather required entitlement information.

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## HP installation and configuration assistance

A moderate level of SAN-related knowledge is required to successfully install this product. If you are not familiar with installing and configuring storage array systems in a SAN, HP can install your MSA1500 cs for you.

For more information, access our web site at [http://www.hp.com/hps/storage/ns\\_implementation.html](http://www.hp.com/hps/storage/ns_implementation.html).

Depending on your needs, different levels of assistance are available.

For example, the HP Installation and Startup for HP StorageWorks Disk Arrays Service Package includes:

- Physical installation of the MSA1500 cs
- Virtual disk design and configuration of the MSA1500 cs
- Service planning
- Service deployment
- Installation Verification Testing (IVT)
- Customer orientation

## HP technical support

Telephone numbers for worldwide technical support are listed on the following HP web site: <http://www.hp.com/support/>. From this web site, select the country of origin.

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**Note:** For continuous quality improvement, calls may be recorded or monitored.

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Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers, model names, and model numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

## HP storage web site

The HP storage web site has the latest information about this and other HP storage products. Access the primary storage web site on the Internet at <http://www.hp.com/country/us/eng/prodserv/storage.html>. From this web site, select the appropriate product or solution.

## HP authorized reseller

For the name of your nearest HP authorized reseller, refer to the HP web site for locations and telephone numbers: <http://www.hp.com>.

# Installation Procedures - All Deployments



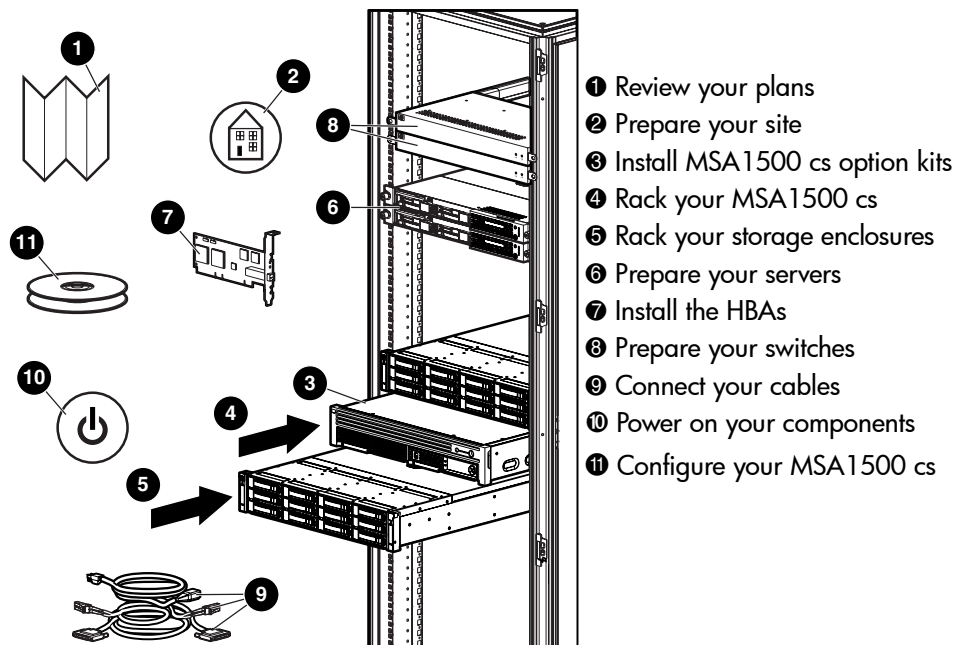
Installing and configuring your MSA1500 cs includes the following steps, each of which is illustrated in [Figure 1](#) and discussed in this chapter:

- [Step 1: Review and confirm your plans](#), page 17
- [Step 2: Prepare your site](#), page 26
- [Step 3: Install MSA1500 cs option kits](#), page 28
- [Step 4: Rack the MSA1500 cs and the storage enclosures](#), page 29
- [Step 5: Install the hard drives](#), page 35
- [Step 6: Prepare your servers](#), page 36
- [Step 7: Install the HBA in your servers](#), page 37
- [Step 8: Prepare your switches](#), page 38
- [Step 9: Connect the cables](#), page 39
- [Step 10: Power on your MSA1500 cs](#), page 49
- [Step 11: Configure your MSA1500 cs](#), page 53

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## Note:

- HP recommends installing and configuring your MSA1500 cs in the sequence of steps listed in this guide. There are specific dependencies and if you deviate from this sequence, you may have to uninstall and then reinstall your MSA1500 cs.
  - If a supplier is installing or configuring the MSA1500 cs for you, provide them with this guide and verify that they complete the information in [“MSA1500 cs Worksheets”](#) on page 85.
  - For information about HP installing and configuring your MSA1500 cs, see [“Getting help”](#) on page 13.
  - After the hardware is installed and you are ready to configure your MSA1500 cs, read the information in [“Step 1: Review and confirm your plans”](#) on page 17 and then proceed to [“Step 11: Configure your MSA1500 cs”](#) on page 53.
-



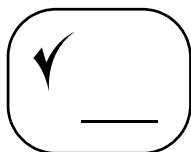
**Figure 1: Overview of the MSA1500 cs installation procedures**

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**Note:** When installing items in your rack, follow industry-standard recommendations, including:

- Locate the heaviest items, such as Uninterruptable Power Supplies (UPS) near the bottom of the rack.
  - Rack some of the storage enclosures above the MSA1500 cs and some of the storage enclosures below the MSA1500 cs.
-

## Step 1: Review and confirm your plans



Before installing your MSA1500 cs, HP recommends thoroughly researching, studying, and establishing an installation and configuration plan for your environment. Proper planning ensures a successful installation of your MSA1500 cs.

- [Complete the planning worksheet on the configuration overview poster](#)
- [Go to the Internet for the most recent MSA1500 cs and SAN information](#)
- [Plan your storage configuration](#)
- [Review MSA1500 cs installation best practices](#)

### Complete the planning worksheet on the configuration overview poster

The printed MSA1500 cs Configuration Overview poster, included in the shipping carton, is a companion to this Installation Guide, and should be completed before installing your MSA1500 cs.

Use the poster to:

- Gather all of the components necessary for installing your MSA1500 cs
- Verify that the components you plan to use are supported for use with the MSA1500 cs and your operating system environment
- Record important information about the components that you plan to use
- Learn about this installation process

**Record system information in the worksheets in Appendix C: “[MSA1500 cs Worksheets](#)” on page 85 or on the poster.**

**Information in these worksheets is required for multi-pathing, future configuration changes, and troubleshooting purposes.**

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**Note:** If a supplier is installing the MSA1500 cs for you, be sure that they complete these worksheets.

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## Go to the Internet for the most recent MSA1500 cs and SAN information

HP recommends going to the following web sites to learn more about the MSA1500 cs and Storage Area Networks (SANs). Information found at these web sites may offer suggestions, alternatives, or changes to your installation plans.

**Table 2: MSA1500 cs and SAN-related Web Sites**

Web Site	Content
MSA1500 cs <a href="http://www.hp.com/go/msa1500cs">www.hp.com/go/msa1500cs</a>	<p>Latest MSA1500 cs information, including:</p> <ul style="list-style-type: none"> <li>■ Release Notes - latest MSA1500 cs information</li> <li>■ Compatibility Guide - supported components</li> <li>■ QuickSpecs - technical information</li> <li>■ Latest controller firmware version and support software CD</li> </ul>
SAN Infrastructure <a href="http://www.hp.com/go/san">www.hp.com/go/san</a>	<p>HP switch and Host Bus Adapter information</p> <p>Locate, print, and read the SAN Design Reference Guide, which details SAN design considerations and rules, common topologies, security, and best practices.</p>
HP Systems Insight Manager <a href="http://www.hp.com/go/hpsim">www.hp.com/go/hpsim</a>	<p>System management information</p> <p>Portions of Insight Manager are provided on the HP Management CD and the MSA1500 cs Support Software CD, both of which are included in the shipping carton of the MSA1500 cs.</p> <p>Installation instructions are included in later sections of this guide.</p>
High Availability <a href="http://h18000.www1.hp.com/solutions/enterprise/highavailability/index.html">h18000.www1.hp.com/solutions/enterprise/highavailability/index.html</a>	<p>Clustering information</p> <p>In addition to specific information about clustering, this web site contains a variety of planning and best practices documents that are applicable to most server and storage sub-systems.</p>
Secure Path <a href="http://www.hp.com/go/securepath">www.hp.com/go/securepath</a>	<p>Multi-pathing software for Windows, Linux, and NetWare</p> <p>A unique version of Secure Path is provided for each supported operating system. Versions are also available for MSA1000 / 1500 cs-only environments. If your SAN environment includes only MSA1000 controllers, use the appropriate "Workgroup Edition" of Secure Path.</p>
Array Configuration Utility (ACU) <a href="http://h18000.www1.hp.com/products/servers/proliant/storage/software-management/acumatrix/index.html">h18000.www1.hp.com/products/servers/proliant/storage/software-management/acumatrix/index.html</a>	<p>Storage configuration software for Windows, Linux, and NetWare</p> <p>The ACU is provided on the MSA1500 cs Support Software CD, included in the shipping carton of the MSA1500 cs.</p> <p>Installation instructions are included in later sections of this guide.</p>

## Plan your storage configuration

Proper planning of system storage and its subsequent performance is critical to a successful deployment of your MSA1500 cs. Improper planning or implementation can result in wasted storage space, degraded performance, or inability to expand the system to meet growing storage needs.

Considerations include:

- [System and performance expectations](#)
- [Striping methods](#)
- [RAID levels](#)
- [Hard drive sizes and types](#)
- [Spare drives](#)
- [LUN sizing \(capacity\)](#)

### System and performance expectations

To help you determine the best way to configure your storage, you must first rank the following three storage characteristics in order of importance:

- Fault tolerance (high availability)
- I/O performance
- Storage efficiency

With your priorities established, you can determine which striping method and RAID level to use.

As highlighted in the following sections on [Striping methods](#) and [RAID levels](#), some configuration methods offer greater fault tolerance, while other configuration methods offer better I/O performance or storage efficiency.

## Striping methods

A storage array combines the capacity of several physical hard drives into one virtual unit called an array or logical unit (LUN.) These LUNs are then presented to the operating system as a single disk device. The physical layout of a LUN can be one of two configurations:

- Vertical striping
- Horizontal striping

In a vertical configuration, a LUN uses hard drives from separate storage enclosures and different SCSI buses. In a horizontal configuration, the LUN uses multiple drives contained within the same storage enclosure.

Vertical and horizontal LUNs each have advantages and disadvantages:

- Vertical striping offers ultimate fault tolerance and performance, but at the price of storage efficiency
- Horizontal striping allows for the creation of large LUNs and efficient use of storage capacity, but at the price of I/O performance and less fault tolerance.

## RAID levels

In conjunction with the striping method, the assigned RAID level also determines the fault-tolerance, I/O performance, and storage efficiency of the LUN.

See [Table 3](#) on page 21 for a comparison list of the different RAID levels.

When selecting a RAID level for a LUN, consider the type of data that will be stored on the array.

For example:

- For transitional data, you may want to use RAID 0, which provides no fault tolerance, but provides rapid storage and access of large amounts of data.
- For critical data, use a fault-tolerant RAID level, such as RAID 1, RAID 1+0, RAID 5, or RAID ADG, choosing the RAID level that offers the desired combination of fault-tolerance, I/O performance, and storage efficiency.

Depending on the assigned RAID level, one or more drives within a LUN can fail without bringing the drive sub-system down.



**Table 3: RAID Level Comparison**

RAID Level	Alternative Name	I/O Performance	Fault Tolerance	Storage Efficiency
RAID 0	Data striping	Highest	None	Highest
RAID 1  RAID 1+0	Drive mirroring  Data striping plus drive mirroring	High *	Highest *	Low
RAID 5	Data striping, with one set of distributed parity data	Medium	Medium	High
RAID ADG	Data striping, with two sets of distributed parity data	Low	High	Medium
* Drives in the LUN are striped across separate enclosures on SCSI different buses.				

**Note:** For detailed information about the different RAID levels, refer to the *HP Array Configuration Utility User Guide*. This guide is available on the MSA1500 cs Documentation CD.

## Hard drive sizes and types

Hard drives in each enclosure and included in the same LUN should be the same size and type. When drive sizes and types are mixed within a storage enclosure, the usable capacity and the processing ability of the entire storage sub-system is affected.

When hard drives of different type or size are included in the same enclosure, the processing characteristics of the entire enclosure are reduced to that of the slowest and smallest drive.

When hard drives of different sizes are included in a LUN, the LUN defaults to the smallest individual drive size and capacity in the larger drives is unused.

## Spare drives

HP recommends including spare drives in your LUNs.

Spare disks are disks that are not active members of any particular LUN, but have been configured to be used in the event that a disk in one of the LUNs should fail. If a spare is present and a physical drive fails, the spare automatically replaces the failed drive as a member of the LUN and the process of rebuilding the information onto the spare automatically begins. The system uses the mirrored or parity information from the other member disks to reconstruct the data onto the spare drive.

## LUN sizing (capacity)

When planning for optimal file serving performance, the number of hard drives necessary to maintain an optimum performance level must be determined.

As a general rule, the greater the number of drives that are included in a LUN, the greater the performance level that can be achieved. However, the performance considerations are offset by fault tolerance considerations — the greater the number of drives in a LUN, the higher the probability of one or more disk failures in that LUN.

## Review MSA1500 cs installation best practices

- Before installing your MSA1500 cs (and periodically afterwards), go to the MSA1500 cs web site at <http://www.hp.com/go/msa1500cs> to confirm your installation plans and read current information about the MSA1500 cs.
- Use the MSA1500 cs Configuration Overview poster to help you gather all of the items required for your MSA1500 cs installation.
- Record information about your system in the provided worksheets.

This information is needed when configuring the storage, entering connection information, setting up multi-pathing, and for future configuration changes and reference purposes.

Use the “Configuration Planning Worksheet” on the Configuration Overview poster or “[MSA1500 cs Worksheets](#)” on page 85 of this guide.

- Install your MSA1500 cs in the sequence listed in this guide.

Several installation and configuration steps include dependencies and if you deviate from the listed sequence, you may have to uninstall and then reinstall your MSA1500 cs. Difficulties that you encounter by not following the directions in this guide may result in lost time and lost revenue while troubleshooting the issues.

For example, in a Windows environment, when you power up the server after installing the HBA for the MSA1500 cs, Windows displays a “New Hardware Found” message and prompts to install an HBA driver. You must cancel out of this window or Windows will install an HBA driver that is unsupported for use with the MSA1500 cs.

- When installing or updating HBA drivers, always use the drivers and installation scripts provided on the MSA1500 cs Support Software CD and the MSA1500 cs web site.

The MSA1500 cs will not operate as intended if you update your HBA driver manually or use drivers obtained from the HBA manufacturer.

- Consider redundancies of power, storage, and data paths.
  - To provide redundant power, plug the two power supplies on the MSA1500 cs into separate Uninterruptable Power Supplies (UPS) on separate sources of power.

If you have only one UPS, maintain separate power paths by plugging one MSA1500 cs power supply to the UPS on one power source and plug the other MSA1500 cs power supply to a separate power source.
  - To provide redundant storage, configure your LUNs using fault-tolerant RAID levels and striping methods.

Stripe the LUNs vertically across separate storage enclosures on different SCSI buses, including drives from each bus.
  - To provide redundant data paths, you must include two separate and isolated Fibre Channel fabrics and the associated hardware and software components in the configuration.

You must include two MSA1500 cs controllers, two Fibre Channel interconnect devices (switches), and two HBAs in each server.  
Environments using Secure Path software must install the software on each server with access to the MSA1500 cs.
- If you are connecting the MSA1500 cs to existing servers, you may need to re-install some of your management software, such as Secure Path, after installing the MSA1500 cs.
- If your environment includes multiple servers, HP recommends designating one of the servers as a management server, to centralize management tasks.

It is on this server that you install management software such as the ACU, and it is from this server that you perform SAN management tasks.

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**Note:** In multi-path environments, you must install some management software, such as the ACU and Secure Path, on each server with access to the MSA1500 cs.

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- If you are installing the MSA1500 cs in a multi-path environment that requires Secure Path software, be sure to follow every server reboot prompt. Failure to acknowledge a server reboot prompt may result in your path redundancy not functioning properly.

Secure Path installation requires at least two reboots: after the file copy from the source media and after the redundancy driver is attached to the LUNs. If the operating system does not prompt for a second reboot within five minutes after logging in, manually reboot the server.
- HP recommends using the same utility to configure and manage the storage. Use either the ACU or the CLI exclusively.
- When planning and configuring the LUNs:
  - Optimize performance and redundancy by striping the drives in the array across separate storage enclosures on different SCSI buses, especially in mirrored environments using RAID 1 or RAID 1+0.
  - Minimize exposure during a drive failure by setting the drive rebuild priority of the LUNs to “high.”
  - Customize the RAID level and striping method to the type of data that will be stored on the LUN.

---

**Note:** Depending on the number of drives included in an array, the ACU automatically assumes a default RAID level of ADG, which offers a high level of fault tolerance, but at a significant cost to I/O performance.

For comparable fault tolerance but higher performance, consider using RAID 1+0.

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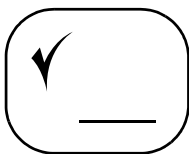
- After configuring the LUNs, remember to:
  - Identify the operating system of each HBA with access to the storage.
  - Verify that each HBA in each server has been granted access to the storage.
  - Control access to the storage by indicating which HBA can access which LUN.

---

**Note:** Multi-path configurations using the ACU must access the ACU from each server and grant the redundant HBA access to the storage.

---

## Step 2: Prepare your site



To ensure continuous, safe, and reliable operation of your equipment, place your system in an approved environment. You must provide adequate physical space, ventilation, and power.

In addition to the following discussion, see [Table 4, “MSA1500 cs Specifications”](#) on page 27 for a detailed list of site requirements.

### Provide adequate structural support for the floor

Calculate the total weight of your equipment and verify that your site can support the weight.

For HP ProLiant server environments, consider using Rack Builder, a software tool that provides a simplified method to planning and configuring racks and rack-mountable products. Rack Builder is available on the **Options** tab of the **ProLiant Home** page of the HP servers web site at <http://www.hp.com/country/us/eng/prodserv/servers.html>.

### Provide adequate clearance space and ventilation

Be sure to provide adequate clearance around the front and back of the racks. Provide at least 25 inches (63.5 cm) in the front of the rack to allow the doors to open fully and provide at least 30 inches (76.2 cm) in the rear of the rack to allow for servicing and airflow.

If there are unused spaces in your rack, attach blanking panels across those empty spaces, to force the airflow through the components instead of through the open spaces.

### Provide adequate and redundant sources of power

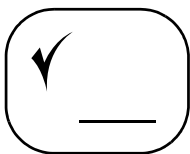
Make sure that you have two high-line power feeds installed near your computer. These two power sources usually come from the same external power grid, but occasionally may originate from different grids or even different sources entirely.

For protection against a power-source failure, obtain and include in your installation two Uninterruptable Power Supplies (UPS.)

**Table 4: MSA1500 cs Specifications**

Parameter	Value
Dimensions: Height Width Depth	3.46 in (8.79 cm) 24.0 in (60.96 cm) 17.64 in (44.81 cm)
Weight Shipping configuration	41.6 lb (18.9 kg)
Input Power: Rated Input Voltage Rated Input Frequency Maximum Rated Input Current Maximum Input Power	100 to 240 VAC 47-63 Hz 1.3 A 160 W*
Heat Dissipation (max)	2187 Btu/hr*
Temperature Ranges: Operating temperature  Shipping temperature	50° F to 95° F (10° C to 35° C) [derated 1.8° F (1° C) per 1000 ft (304.8 m) of elevation to 10,000 ft (3048 m)] -22° F to 122° F (-30° C to 50° C)
Relative Humidity (non-condensing): Operating  Non-operating	10% to 90%  up to 95%
Maximum Wet bulb Temperatures: Long term storage  Short term storage	84.2°F (29°C)  86°F (30°C)
*Input power and heat dissipation specifications are maximum values and apply to worst-case conditions at full-rated power supply load. The power/heat dissipation for your installation varies depending on the equipment configuration.	

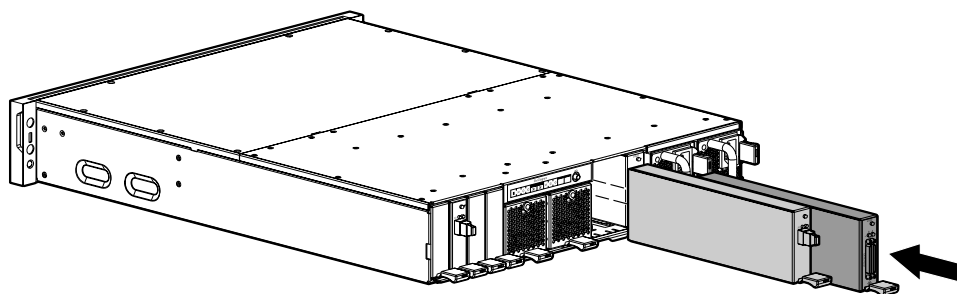
## Step 3: Install MSA1500 cs option kits



If your plans include adding any of the available option kits for the MSA1500 cs, install them now. It is easier to install these options before racking the system.

MSA1500 cs option kits include:

- Additional controller cache
- Additional SCSI I/O module
- Redundant MSA1000 controller
- Redundant Fibre Channel I/O module



**Figure 2: Installing a redundant Fibre Channel module and additional SCSI module**

---

**Note:** When installing a redundant MSA1000 controller, you must also obtain and install an additional Fibre Channel I/O module. Redundant (multi-path) environments must include separate and complete Fibre Channel fabrics and the associated hardware and software components, including two controllers, two Fibre Channel I/O modules, two Fibre Channel switches, and two HBAs in each server.

---

---

**Note:** When installing additional SCSI I/O modules, HP recommends populating the SCSI I/O module bays from right-to-left, so that the attached storage enclosures are added in pre-assigned box-number order. See [“Recommended SCSI cable connections”](#) on page 40 for more information.

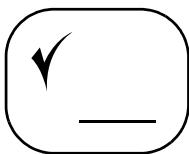
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For information about installing the options, refer to the instructions that came with the option kit.

Go to [Table 9: “MSA1500 cs Information”](#) on page 86 to record information about your option kits.



## Step 4: Rack the MSA1500 cs and the storage enclosures



The MSA1500 cs and its supported storage enclosures can be installed into most standard server racks. To verify that the rack and the storage enclosures you plan to use are supported for use with the MSA1500 cs and its storage enclosures, read the *MSA1500 cs Compatibility Guide*, located on the MSA1500 cs **Technical Documentation** page at <http://www.hp.com/go/msa1500cs>.



**Caution:** Install the hard drives in the enclosures only after mounting the enclosures in the rack.

---

Go to **Table 9: “MSA1500 cs Information”** on page 86 to record information about your storage enclosures.

## Rack installation best practices

In addition to industry-standard recommendations, consider the following:

- Locate the heaviest items, such as uninterruptable power supplies (UPS) and additional storage enclosures near the bottom of the rack.
- To accommodate using the shortest possible SCSI cables between the MSA1500 cs and the storage enclosures, rack some of the storage enclosures above the MSA1500 cs and some of the storage enclosures below the MSA1500 cs.
- Install similar components next to each other in the rack.

Because storage enclosures, switches, and servers are of differing depths, to accommodate working behind the rack, if you have more than one of a device, mount those devices adjacent to one another.



**WARNING:** To reduce the risk of personal injury or damage to the equipment, at least two people are required to lift the storage system during removal or installation, if the weight, as assembled for shipping, exceeds 22.7 kg (50 lb). If the system is being loaded into the rack above chest level, a third person **MUST** assist with aligning the system with the rails while the other two people support the weight of the system.

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**Caution:** To prevent damage and to ease insertion of the device into the rack, support the weight of the device and keep it level when sliding it into the rack.

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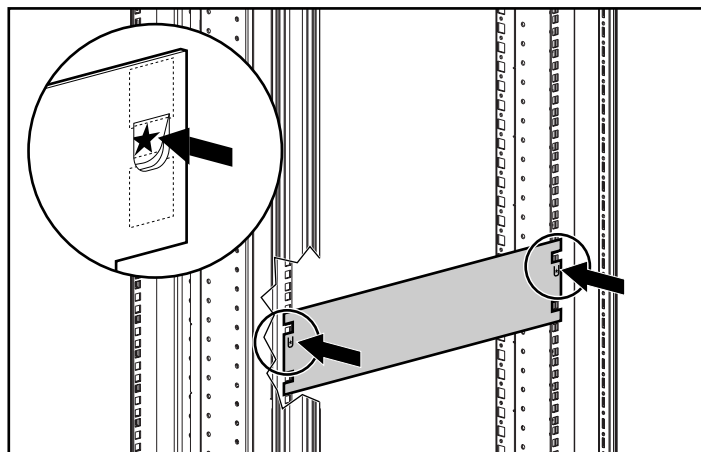


**WARNING:** To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks on the rack are extended to the floor.
  - The full weight of the rack rests on the leveling jacks.
  - The stabilizing feet are attached to the rack if it is a single-rack installation.
  - The racks are coupled together in multiple-rack installations.
  - Only one component in a rack is extended at a time. A rack may become unstable if more than one component is extended.
- 

Use the following instructions to install each MSA1500 cs and storage enclosure:

1. Use the provided rack template as a guide to indicate where the rails for the component are to be located:
  - a. With the front of the template and the rack facing you, align the lower edge of the template with the bottom of the rack (or the top of the previous rack component.)
  - b. After verifying that the template is level, push the template tabs into the rack holes to hold the template in place.



**Figure 3: Using the rack template**

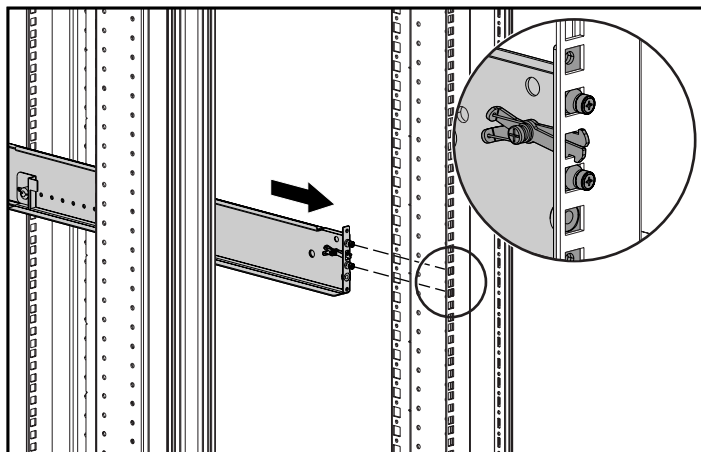
- c. Use a pencil to mark the required location of the scissor-like locking latches on the rails, as indicated by the template.
  - d. Repeat these steps to mark the back of the rack, using the information on the back of the template as a guide.
2. If the holes in the rack uprights are round instead of square, remove the standard pins from the rails and replace them with the round-hole pins provided with the rail kit.



**WARNING:** The pins in the rails are load-bearing. Do not remove the standard pins except to replace them with the pins for round-hole racks.

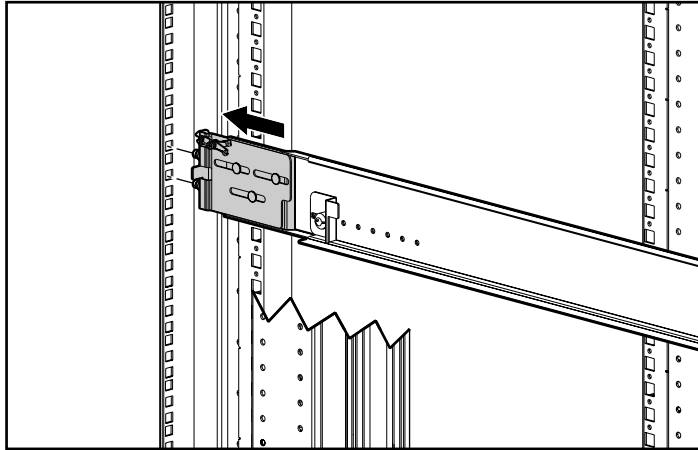
3. Install the rails in the rack:
  - a. Identify the left (L) and right (R) rack rails by markings stamped into the rails.
  - b. Insert the front end of the right rack rail into the inside front of the rack until the pins extend through the holes marked during the rack template procedure.

**Note:** Be sure that the scissor-type locking latch engages when the end of the rail seats into the rack uprights.



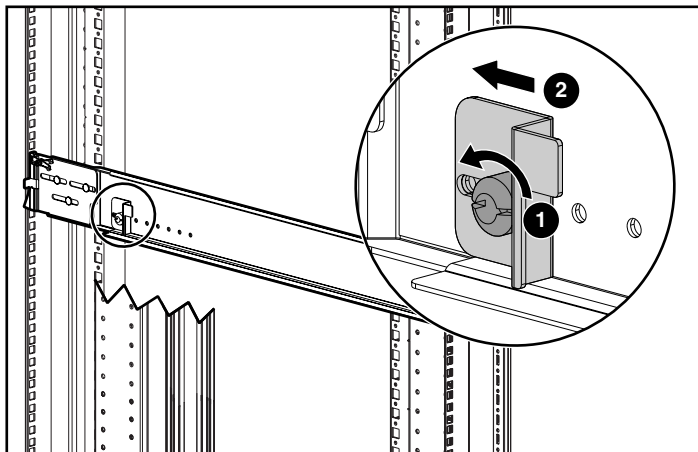
**Figure 4: Installing the front of the right rail into the rack**

- c. Extend the back end of the rail toward the inside rear of the rack until the pins extend through the holes marked during the rack template procedure and the locking latch engages.



**Figure 5: Installing the back of the right rail into the rack**

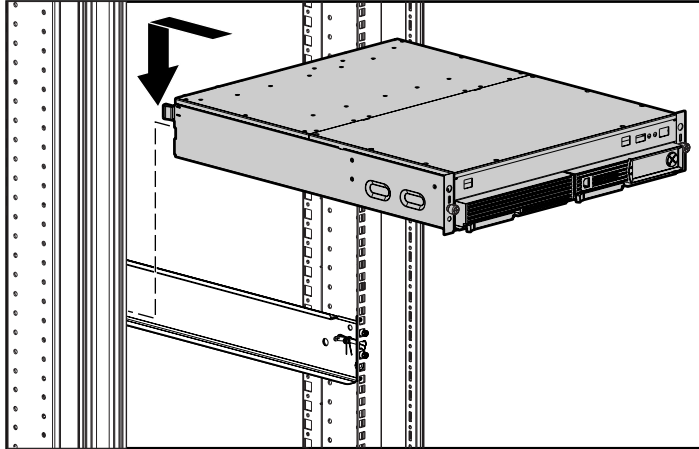
- d. Loosen the locking nut on the shipping retaining bracket and slide the bracket to the farthest position on the rear of the rail.



**Figure 6: Moving the shipping retaining bracket**

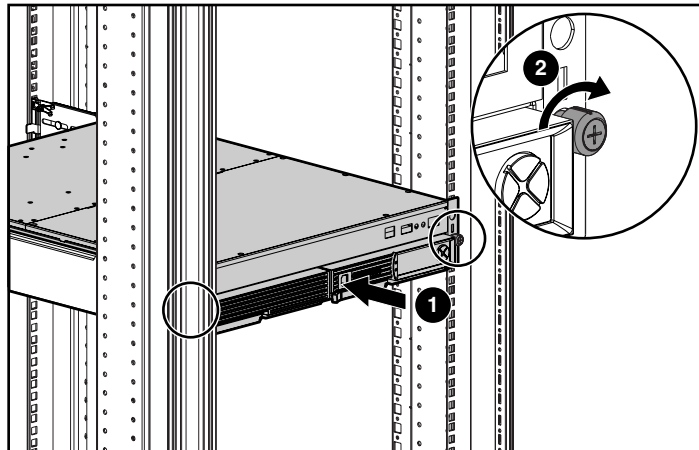
- e. Repeat steps a through d for the left rack rail.

4. Install the component in the rack:
  - a. Remove the bezel from the front of the device, align the device with the rails, and slide it into the rack.



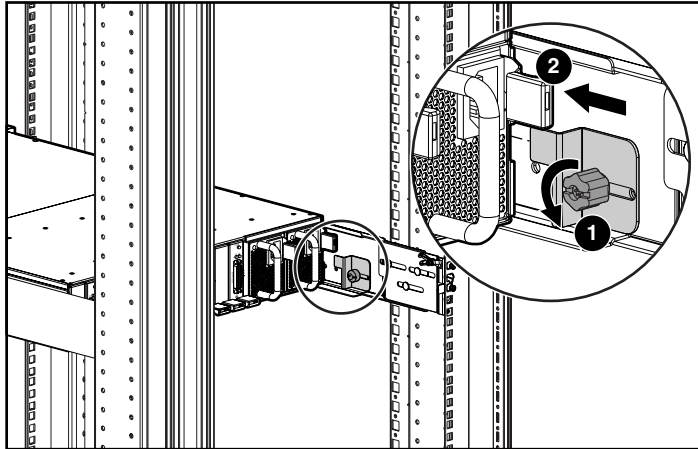
**Figure 7: Installing the device in the rack**

- b. Slide the device into the rack until the front edge is flush with the front of the rack ❶.
    - c. Secure the device to the front of the rack using the provided thumbscrews on the front of the device ❷ and then replace the front bezel.



**Figure 8: Securing the device to the front of the rack**

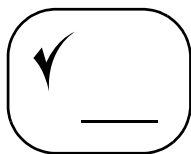
5. Secure the device in the rack:
  - a. Slide the shipping retaining racket forward until the tab engages the slot in the chassis.



**Figure 9: Securing the shipping retaining bracket on the rear of the device**

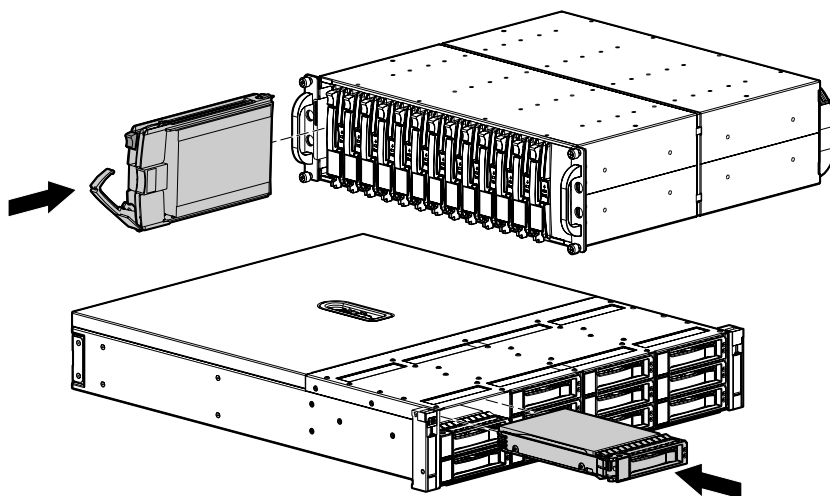
- b. Tighten the thumbscrew on the bracket.
    - c. Repeat these steps for the other rail.

## Step 5: Install the hard drives



After the storage enclosures are installed and secured in the rack, install your hard drives into the drive bays.

For a list of the hard drives that are supported for use with the MSA1500 cs and your storage enclosure, read the *MSA1500 cs Compatibility Guide*, located on the MSA1500 cs **Technical Documentation** page of the MSA1500 cs web site at <http://www.hp.com/go/msa1500cs>.



**Figure 10:** Installing hard drives into sample storage enclosures



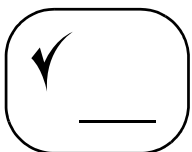
**Caution:** Follow industry-standard practices when handling hard drives.

**Note:** HP recommends installing hard drives in bay-number sequence. Locate this information for your storage enclosure in the enclosure documentation.

For information about installing hard drives, refer to the instructions that came with the hard drive and the enclosure. Make sure the drives are fully seated.

Go to **Table 12: “Hard Drive Information”** on page 92 to record information about your hard drives.

## Step 6: Prepare your servers



In an existing SAN, your servers are already set up and configured, but if you are deploying your MSA1500 cs into a new SAN, install and configure your servers at this time.

HP recommends that you:

- Verify that the servers and operating systems that you plan to use are supported for use with the MSA1500 cs.

For a list of servers and operating systems that are supported for use with the MSA1500 cs, refer to the *HP StorageWorks MSA1500 cs Compatibility Guide*, located on the **Technical Documentation** page of the MSA1500 cs web site at <http://www.hp.com/go/msa1500cs>.

- If more than one server will access the MSA1500 cs, designate one of the servers as a management server.

It is on the management server that you install management software (such as the ACU) and it is from this server that you perform your SAN management tasks. (Instructions for installing the ACU are included later in this guide.)

- Verify that all servers that will access the MSA1500 cs are functioning properly before proceeding to the next step in this guide.

One method of testing the server is to power up the server, start the operating system, and open a commonly used application.

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### Note:

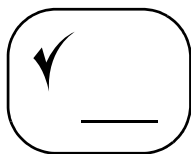
- Some software components, such as Secure Path, must be installed or re-installed after connecting the MSA1500 cs to the server.
  - In multi-path configurations, management software, such as Secure Path and the ACU, must be installed on each server with access to the MSA1500 cs.
- 

For information about installing and configuring your servers, refer to the instructions that came with your server and operating system.

Go to **Table 11: “Server Information”** on page 88 to record information about the servers that will connect to the MSA1500 cs.



## Step 7: Install the HBA in your servers



After you have confirmed that your servers are operating properly, install the HBA for the MSA1500 cs in each of the servers that will access the MSA1500 cs.

Because the MSA1500 cs can be deployed into a variety of operating system environments and configurations (including single-path and multi-path), specific HBA are required for the different deployments.

To confirm that you purchased the correct HBA for your configuration, read the *MSA1500 cs Release Notes* and the *MSA1500 cs Compatibility Guide*, located on the MSA1500 cs **Technical Documentation** page at <http://www.hp.com/go/msa1500cs>.



**Caution:** Do not power-on your server.

Powering on the server before instructed may cause an unsupported HBA driver to be installed automatically by the operating system.

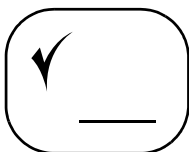
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For information about installing the HBA, refer to the instructions that came with the HBA or the server.

Go to **Table 11: “Server Information”** on page 88 to record information about the HBA in each server that will connect to the MSA1500 cs.

Some information about the HBA may be printed on the HBA or on its shipping carton. If this information is not available now, you can obtain it later through the Command Line Interface or by viewing the monitor connected to the server during the server power-on self-test (POST).

## Step 8: Prepare your switches



In an existing SAN, your switches are already set up and configured, but if you are deploying your MSA1500 cs into a new SAN, you need to install and configure your Fibre Channel switches at this time.

---

**Note:** If you are connecting the Fibre Channel I/O module of the MSA1500 cs directly to the HBA in the server, proceed to the next step.

---

HP recommends that you:

- Confirm that the switch you plan to use is approved for use with the MSA1500 cs.

For a list of supported switches, refer to the *HP StorageWorks MSA1500 cs Compatibility Guide*, located on the **Technical Documentation** page of the MSA1500 cs web site at <http://www.hp.com/go/msa1500cs>.

- For newly installed switches, change the IP address of the switch from the default value to a valid IP address.
- Set up zoning on the switch to control access to the MSA1500 cs.

In a SAN environment with multiple servers and storage systems, you must isolate each storage system to protect it from unauthorized access.

To properly isolate your storage system, establish zoning on the switch and (after the storage is configured) establish Selective Storage Presentation (SSP) settings or Access Control Lists (ACL) for the LUNs.

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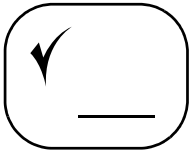
**Note:** Although the MSA1500 cs can support the use of some 1 Gbps (gigabit per second) devices, HP recommends connecting the MSA1500 cs to 2 Gbps devices only. Optimum performance is obtained through using the faster devices.

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Refer to the documentation included with the switch for installation and configuration instructions.

Go to **Table 10: “External Fibre Channel Interconnect Device (Switch) Information”** on page 87 to record information about the switches that will connect to the MSA1500 cs.

## Step 9: Connect the cables



At this point in the process of installing your MSA1500 cs, you have either installed your new SAN or prepared your existing SAN for the MSA1500 cs, your server is ready, your switch is ready, and the MSA1500 cs is ready.

Now is the time for:

- [Connecting the SCSI cables](#)
- [Connecting the Fibre Channel cables](#)
- [Connecting the power cords](#)

Each of these connection types is discussed in the following paragraphs.

### Cabling best practices

- Use the shortest possible cable between devices.  
Shorter cables are easier to manage and route along the back of the rack. In addition, shorter cables reduce the possibility of signal degradation that may occur over longer distances.
- Gather the cables in the rear of the MSA1500 cs to ensure that the cabling in the back of the rack system does not interfere with system operation or maintenance.  
Bind the cables loosely with cable ties and route the excess cables out of the way, along the side of the rack. When the cables are tied together and routed down the side of the rack, system components and indicators are easily visible and accessible.
- Attach a label near both ends of each cable to identify the device connected to that cable.  
Include the device, device name, port, or other information that you think will be helpful.
- Use colored markers to color-code both ends of each cable, to help you visually identify a particular cable without having to read or locate the label.
- In redundant configurations, you may want to loosely bind the matching pair of cables connecting devices.

## Connecting the SCSI cables

To connect the MSA1500 cs to the storage enclosures, use standard VHDCI SCSI cables, included in the shipping carton with each storage enclosure.

### Recommended SCSI cable connections

HP recommends installing additional SCSI I/O modules and connecting storage enclosures in the same sequence as the pre-assigned box numbers, as illustrated in [Figure 11](#).

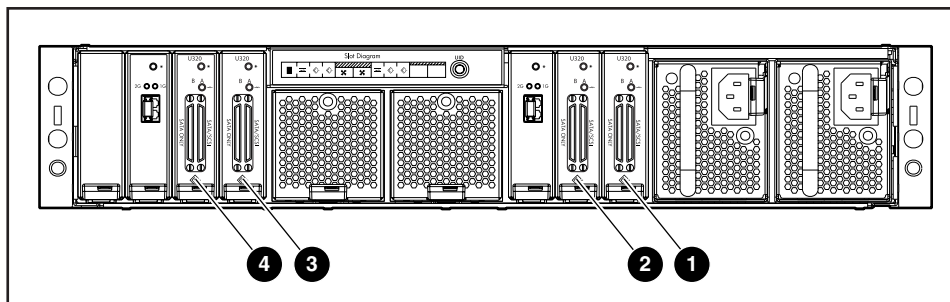


Figure 11: SCSI I/O modules, bus numbers, and box numbers

Item	SCSI Bus	Port	SATA Box Numbers	SCSI Box Numbers
①	0	A	1	1
		B	5	not used
②	1	A	2	2
		B	6	not used
③	2	A	3	3
		B	7	not used
④	3	A	4	4
		B	8	not used

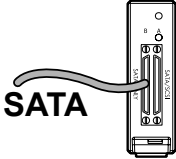
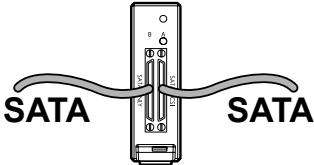
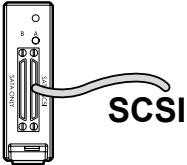
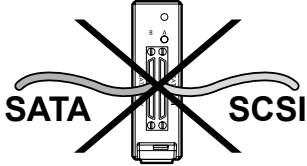
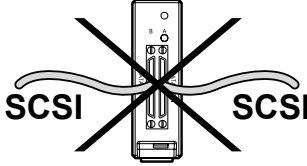
Go to [Table 12 “Hard Drive Information”](#) on page 92 to record information about each storage enclosure.

## Supported and unsupported SCSI connections

Each MSA1500 cs SCSI I/O module has two ports — depending on the type of storage enclosure you plan to connect, one or both of the ports may be supported.

See [Table 5](#) for examples of supported and unsupported connections and see [Figure 12](#) and [Figure 13](#) for illustrations of sample configurations.

**Table 5: Supported / Unsupported SCSI Cable Connections**

Supported	Unsupported
	
	
	
	
	

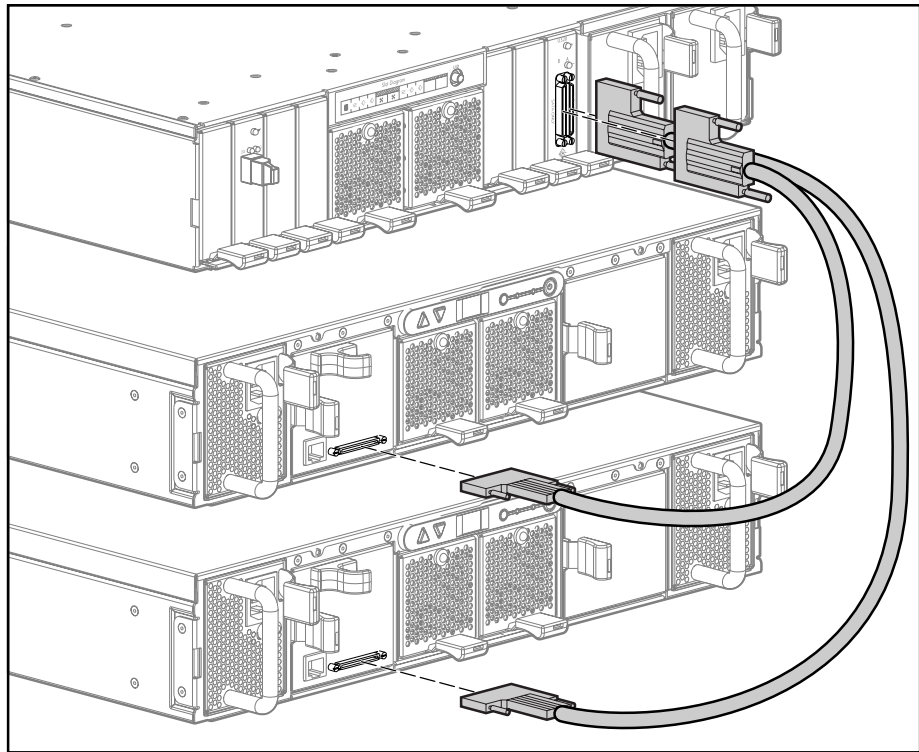
## Connecting the MSA1500 cs to SATA storage enclosures

The following illustration shows the MSA1500 cs connected to two MSA20 SATA storage enclosures.

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**Note:** Tighten the thumbscrews on the SCSI cables to ensure a secure connection.

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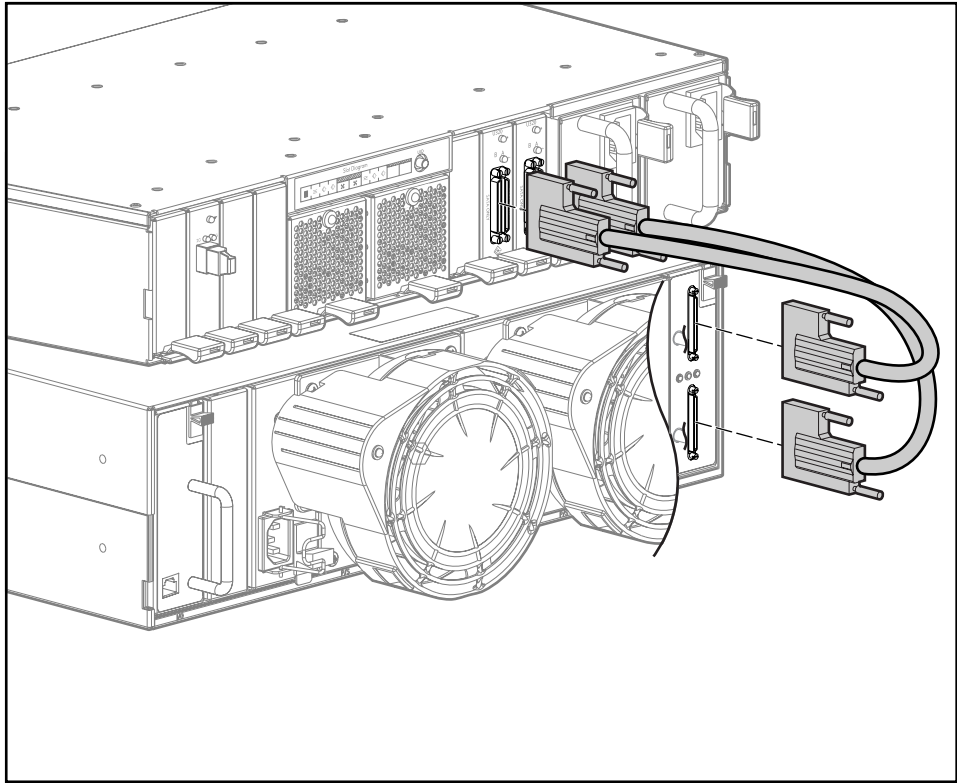


**Figure 12: SCSI cable connections to two MSA20 SATA storage enclosures**

## Connecting the MSA1500 cs to a sample SCSI storage enclosure

The following illustration shows the MSA1500 cs connected to one dual-bus MSA30 SCSI storage enclosure.

**Note:** Tighten the thumbscrews on the SCSI cables to ensure a secure connection.



**Figure 13: SCSI cable connections to one MSA30 SCSI storage enclosure**

## Connecting the Fibre Channel cables

Your MSA1500 cs can be deployed into a variety of configurations, from relatively simple single-path configurations to more complex multi-path configurations. Because there are two switches, two HBAs, and two servers in multi-path (redundant) configurations, all of which use Fibre Channel cables, cable connections must follow specific installation requirements.



---

**Caution:** Use appropriate precautions when handling Fibre Channel cables:

- Touching the end of a Fibre Channel cable will either damage the cable or cause performance problems, including intermittent difficulties accessing the storage.
  - Whenever a Fibre Channel cable is not connected, replace the protective covers on the ends of the cable.
  - Make certain that the Fibre Channel cables are installed and supported so that no excess weight is placed on the connectors. This prevents damage to the connector and cable. Excess cable should be loosely coiled and tied out of the way, being careful not to coil the cable in a tight loop with a bend radius of less than 3 inches (7.62 cm).
- 

To connect the MSA1500 cs to the SAN, use standard Fibre Channel cables.

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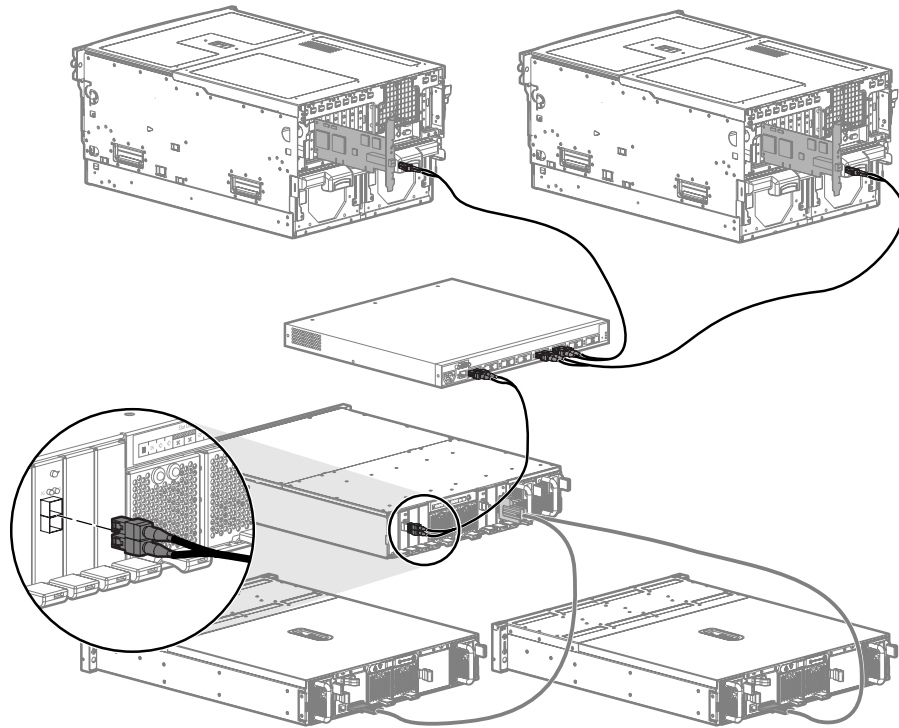
**Note:** See the illustrations on the following pages for sample cabling configurations for a single-path and a multi-path installation.

---



## Connecting Fibre Channel cables in a single-path configuration

Figure 14 shows the Fibre Channel cable connections of an MSA1500 cs being accessed by two servers in a single-path configuration.



**Figure 14: Sample Fibre Channel cable connections, single-path configuration**

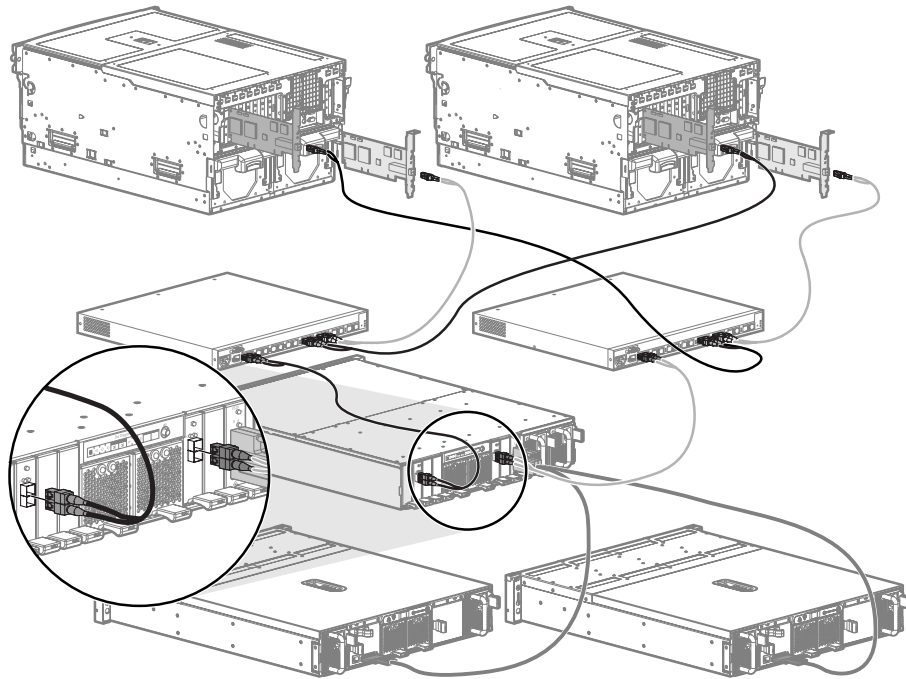
## Connecting Fibre Channel cables in a multi-path configuration

Figure 15 shows the Fibre Channel cable connections of an MSA1500 cs being accessed by two servers, but in a multi-path configuration.

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**Note:** Multi-path configurations must include:

- Two MSA1000 controllers
  - Two MSA1500 cs Fibre Channel I/O modules
  - Two Fibre Channel switches
  - Two servers, each with two HBAs
- 



**Figure 15: Sample Fibre Channel cable connections, multi-path configuration**

## Connecting the power cords

To protect your system from power-failure-related downtime, each MSA1500 cs ships standard with a redundant power supply. Depending how you connect the power supplies to your power source, you can eliminate down time caused by power-related failures.

When connecting the power cords, use the power cords shipped with the MSA1500 cs. After power is supplied to the MSA1500 cs, the power supply automatically senses the input voltage and the LED behind the power switch illuminates as solid amber.

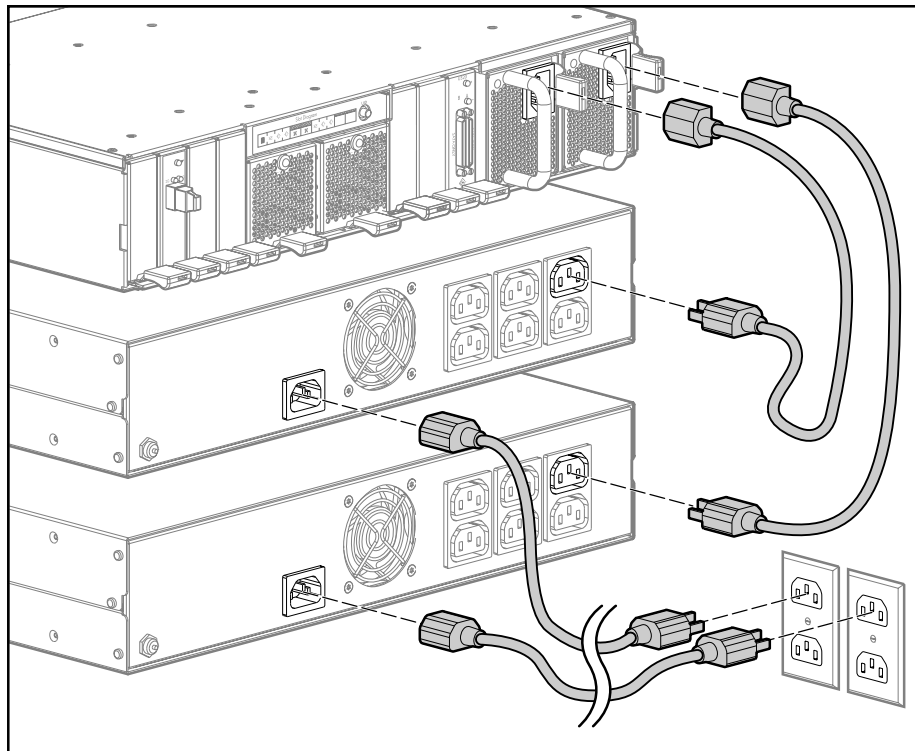
**Table 6: Levels of Protection Against Power Failures**

Connection Method	Level of Protection
MSA1500 cs power supplies connected to: ■ one power source	<ul style="list-style-type: none"> <li>■ Protects you from down time when one of the MSA1500 cs power supplies fails.</li> </ul> <p>The remaining power supply/fan module can operate the MSA1500 cs until a replacement module is installed.</p>
MSA1500 cs power supplies connected to: ■ two separate power sources	<ul style="list-style-type: none"> <li>■ Protects you from down time when one of the MSA1500 cs power supplies fails.</li> <li>■ Protects you from data loss when <b>one</b> of your power sources fails, due to a pulled cable, tripped breaker.</li> </ul> <p>The remaining power source can power the MSA1500 cs until the failed power source is restored or relocated. Depending on the cause and duration of the power outage, you can use this time to properly shut down your storage sub-system</p>
MSA1500 cs power supplies connected to: ■ two UPS ■ two separate power sources	<ul style="list-style-type: none"> <li>■ Protects you from down time when one of the MSA1500 cs power supplies fails.</li> <li>■ Protects you from data loss when <b>one or both</b> of your power sources fails, due to a pulled cable, tripped breaker or local power outage.</li> </ul> <p>The remaining power source or the UPS will power the MSA1500 cs until power is restored to the source. Depending on the cause and duration of the power outage, you can use this time to properly shut down your storage sub-system.</p>



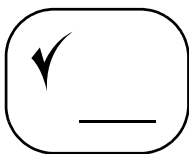
**WARNING:** To reduce the risk of electric shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
- To remove power to the equipment, unplug the power cord from the power supply.
- Route the power cord so that it is not likely to be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord is attached to the MSA1500 cs.



**Figure 16: Connecting the power cords, using two UPS**

## Step 10: Power on your MSA1500 cs



After the MSA1500 cs is installed and connected to the SAN, you may power up all of the devices in the SAN.

1. Apply power to each UPS.
2. Apply power to each external Fibre Channel switch.
3. Apply power to each attached storage enclosure.
4. Power on the MSA1500 cs by pressing the power switch located on the front panel of the MSA1500 cs.

The LED on the power switch changes from amber to solid green, indicating that the MSA1500 cs has been powered on.

5. Wait for the MSA1500 cs to complete its startup routine and the following message to display on the LCD panel on the front of the MSA1500 cs:

MSA1500 Startup Complete

This startup process may take up to four minutes.

---

**Note:** If you installed a redundant controller and Fibre Channel I/O module, the `CLONE FIRMWARE` message may be displayed. Press the ">" button on the controller to copy the firmware from the right controller to the left (new) controller.

---

---

**Note:** Proceed to the next step only after the `Startup Complete` message is displayed. If you power up the server before the MSA1500 cs has completed its power-on sequence, your server may not see the MSA1500 cs properly.

---

6. Apply power to the servers in the SAN with access to the MSA1500 cs, start the operating system, and log on as user with administrative control.



**Caution:** When you power on the server, the monitor may display a "New Hardware Found" message and prompt to install an HBA driver.

You must cancel out of this window or the operating system will install an HBA driver that is unsupported for use with the MSA1500 cs.

---

7. Verify that each component in the SAN is operating properly.

## Verify the operating status of the MSA1500 cs

To verify the operating status of the MSA1500 cs:

- [View the LEDs on the MSA1500 cs](#)
- [Read the messages on the controller display panel](#)

## View the LEDs on the MSA1500 cs

Each module of the MSA1500 cs is equipped with LEDs.

To verify that your MSA1500 cs is operating properly, look for the following LED patterns:

**Table 7: MSA1500 cs Startup Status Lights**

LED	Condition
Power switch	Amber = standby power Solid green = power on
Power supply module	Solid green
Fan module	Solid green
Fibre Channel I/O module (top LED)	Solid green
SCSI I/O module (top LED)	Solid green

If the above LED patterns are not illuminated:

- Check your cable connections between the device and the MSA1500 cs.
- Check the availability of your power source.
- Review the setup instructions in the previous sections of this guide.
- Remove and reinsert the module.
- Refer to the *HP StorageWorks MSA1500 cs Maintenance and Service Guide*, included on the MSA1500 cs Documentation CD and available on the **Technical Documentation** page of the MSA1500 cs web site at <http://www.hp.com/go/msa1500cs>.

## Read the messages on the controller display panel

Each controller contains an integrated LCD panel. This panel displays informational and error messages, shows the current status of the MSA1500 cs, and provides an interface for user input.

To verify that your MSA1500 cs is operating properly, use the arrow buttons on the LCD panel of the controller and look for the following messages:

**Table 8: MSA1500 cs Startup Messages**

Message	Meaning
MSA1500 Startup Complete	The array controller has completed its power on sequence and is operational.
Fibre Sub-System Link Failure	There is no active fiber connection to the MSA controller.  This message is expected, because, although you have physically installed the HBA in the server, you have not yet installed the drivers for the HBA and the MSA1500 cs.  You may safely ignore this message.
00 Array controller Firmware ver <version>	The current version of the firmware running on the controller.

If the MSA1500 Startup Complete message is not displayed:

- Check the cable connections to the MSA1500 cs
- Check the availability of your power source
- Review the setup instructions in the previous sections of this guide
- Refer to the *HP StorageWorks MSA1000 Controller User Guide*, included on the MSA1500 cs Documentation CD and available on the **Technical Documentation** page of the MSA1500 cs web site at <http://www.hp.com/go/msa1500cs>.

Go to **Table 9: “MSA1500 cs Information”** on page 86 to record the controller firmware version.

## **Verify the operating status of the storage enclosures**

To verify that your storage enclosures and hard drives are operating properly, view the enclosure and hard drive LEDs and compare them with the patterns described in the documentation for these devices.

If the LEDs indicate a fault, refer to the documentation that came with the enclosure for help.

## **Verify the operating status of the Fibre Channel switches**

To verify that your switches are operating properly, view the switch LEDs and compare them with the patterns described in the documentation for these devices.

If the LEDs indicate a fault, refer to the documentation that came with the switch for help.

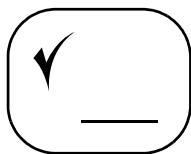
## **Verify the operating status of the server(s)**

Although the MSA1500 cs is not yet visible to the server, verify that the server is operating properly. A simple test is to verify that your operating system loaded and then open a software application or your browser.

If your server is not operating properly, refer to the documentation that came with the server for help.



## Step 11: Configure your MSA1500 cs



After the servers and switches are set up and the MSA1500 cs is physically installed, connected, and powered on, you may customize the server and the MSA1500 cs for your operating system environment and configure the storage according to your plan.

Procedures vary for each operating system, but common steps include:

- [Verify controller firmware and HBA driver versions](#)
- [Select the Storage Configuration Utility to use](#)
- [Configure the MSA1500 cs](#)

### Verify controller firmware and HBA driver versions

To operate your MSA1500 cs, you need controller firmware and HBA drivers.

- Controller firmware is preinstalled on each controller.
- HBA drivers are on the MSA1500 cs Support Software CD, included in the shipping carton with the MSA1500 cs.

In between manufacturing cycles, updated or alternative controller firmware and HBA drivers may be available on the MSA1500 cs web site.

Use the procedures in the following sections to determine whether you should use the shipping configuration of the MSA1500 cs or obtain different firmware and driver versions.

## Determining the controller firmware version to use

To determine if you can use the controller firmware that was preinstalled on your MSA1500 cs or if you should install a different version:

1. With your MSA1500 cs powered on, press the arrow buttons on the front of the controller to scroll through the messages until the following message is displayed:  
  

```
00 Array controller Firmware ver <version>
```

 (Where <version> represents the firmware version installed on the controller.)
2. Record the version of controller firmware on your MSA1500 cs in [Table 9: “MSA1500 cs Information”](#) on page 86.
3. Go to the **Software, Firmware & Drivers** page of the MSA1500 cs web site at <http://www.hp.com/go/MSA1500cs>.



**Caution:** The MSA1500 cs and the MSA1000 storage system both use the MSA1000 controller, but use different firmware versions.

Do not go to the MSA1000 web site for information about the MSA1500 cs.

---

4. Under the **Controller Firmware** banner, select the entry for your server type or operating system.
5. Read the screen display for the Web firmware version and record the version number in [Table 9: “MSA1500 cs Information”](#) on page 86.
6. If the Web version of controller firmware is a greater number than the version preinstalled on your MSA1500 cs or an alternative version is listed for your operating system environment, follow the instructions provided on the web site to download and install this version of firmware on your MSA1500 cs.

## Determining the MSA1500 cs Support Software CD version to use

To determine if you can use the drivers on the MSA1500 cs Support Software CD that was included in the shipping carton with your MSA1500 cs or if you need to download and create a new CD:

1. Obtain the MSA1500 cs Support Software CD for your operating system from the shipping carton of your MSA1500 cs.
2. Read the CD label and record the version of the Support Software CD in [Table 9: “MSA1500 cs Information”](#) on page 86.
3. Go to the **Software, Firmware & Drivers** page of the MSA1500 cs web site at <http://www.hp.com/go/MSA1500cs>.
4. Under the **Software** banner, select **MSA1500 cs Support Software CD**.
5. Read the screen display for the Web version of the Support Software CD and record the version number in [Table 9: “MSA1500 cs Information”](#) on page 86.
6. If the Web version of the Support Software CD is a greater number than the version provided with your MSA1500 cs, follow the instructions provided on the web site to create a new Support Software CD.
7. When instructed in later sections of this guide, insert this new Support CD into the CD-ROM drive of your server.

## Select the Storage Configuration Utility to use

Depending on your operating system and your preference of user interfaces, use one of the following provided utilities to configure the MSA1500 cs:

- Command Line Interface (CLI)
- Array Configuration Utility (ACU)

---

**Note:** See “[Plan your storage configuration](#)” on page 19 and “[Review MSA1500 cs installation best practices](#)” on page 23 for help developing a configuration plan.

---

## About the Command Line Interface

The Command Line Interface (CLI) is built into the controller firmware and can be used to configure, manage, and monitor all aspects of the MSA1500 cs, including hard drive array configuration.

The CLI is accessed by connecting the serial port on a host computer or laptop to the customized RJ-45Z serial port on the front of the MSA1500 cs. The specialized CLI Configuration cable (part number 259992-001) is included in the shipping carton with the MSA1500 cs.

All supported operating systems can use the CLI.

For information about using the CLI, obtain and refer to the Command Line Interface Guide. This guide is available on the MSA1500 cs Documentation CD and the **Technical Documentation** page of the MSA1500 cs web site at <http://www.hp.com/go/msa1500cs>.

---

**Note:** If you plan to use the CLI to configure and manage your storage, HP recommends using the CLI exclusively and not using the ACU.

---

## About the Array Configuration Utility

The Array Configuration Utility (ACU) is a utility that can run locally through your browser or remotely through HP Insight Manager.

---

**Note:** ACU and Insight Manager are included on CDs inside the MSA1500 cs Setup and Management kit.

- Instructions for installing the ACU on your server are included in the configuration chapters of this guide.
  - Instructions for installing Insight Manager on your server are included on the CD.
- 

The ACU may be installed and run from the server or run from its CD. (Diskless servers and some operating systems must run the ACU from the CD.)

To determine if you can use the ACU to help manage an MSA1500 cs in your environment, read the *HP StorageWorks MSA1500 cs Compatibility Guide*, located on the MSA1500 cs **Technical Documentation** page of the MSA1500 cs web site at <http://www.hp.com/go/msa1500cs>.

For information about using the ACU, obtain and refer to the *HP Array Configuration Utility User Guide*. This guide is available on the MSA1500 cs Documentation CD.

For more information about the ACU, refer to the ACU web site at <http://h18000.www1.hp.com/products/servers/proliantstorage/software-management/acumatrix/index.html>

---

**Note:** If you plan to use the ACU to configure and manage your storage:

- HP recommends using the ACU exclusively and not using the CLI.
  - When creating your arrays, the ACU provides suggested settings. Consider these defaults (especially the RAID level and rebuild priority) and make sure that they are acceptable according to your plans.
-

## Configure the MSA1500 cs

To finish installing and configuring your MSA1500 cs, go to the chapter for your specific operating system:

- Chapter 2: [Configuration Procedures - Windows Environments](#), page 59
- Chapter 3: [Configuration Procedures - Linux Environments](#), page 65
- Chapter 4: [Configuration Procedures - NetWare Environments](#), page 73

# Configuration Procedures - Windows Environments

## 2

Deploying the MSA1500 cs in a Microsoft® Windows® environment involves:

1. [Completing all Prerequisites, page 59](#)
2. [Installing the HBA driver on your Windows servers, page 60](#)
3. [Installing the ACU on your Windows management server \(optional\), page 61](#)
4. [Installing Insight Manager on your Windows servers \(optional\), page 62](#)
5. [Configuring the storage, page 63](#)

Each of these procedures is discussed in the following paragraphs.

---

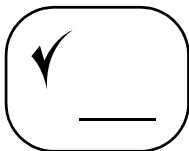
**Note:** HP recommends installing your MSA1500 cs in the sequence of steps listed here and in chapter 1 of this guide. There are specific dependencies and if you deviate from this sequence, you may have to uninstall and then reinstall your MSA1500 cs.

---

## Prerequisites

- Install and connect all equipment correctly, as detailed in [Installation Procedures - All Deployments, page 15](#).
- If using the ACU, install Microsoft Internet Explorer, version 5.5 or greater.
- Obtain the documentation for the storage configuration tool you plan to use. Documentation for the ACU and the CLI are available on the MSA1500 cs Documentation CD.

## Installing the HBA driver on your Windows servers



**Caution:** You must use the MSA1500 cs Support Software CD to install the driver for the HBA on the server. Drivers for all supported HBAs are included on the CD and are the only versions approved for use with the MSA1500 cs. Do not obtain or use an HBA driver from the HBA manufacturer or the MSA1000 web site.

---

1. With the HBA(s) installed in the server, power on the server and start your Windows operating system.
- 

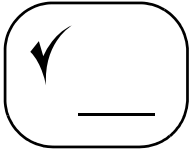
**Note:** If the **New Hardware Wizard** window is displayed, click the **Cancel** button to exit the Wizard. If you do not cancel out of this window, Windows will install an HBA driver that is unsupported for use with the MSA1500 cs.

---

2. Insert the MSA1500 cs Support Software CD into the CD-ROM drive and let it auto-start the installation program.  
  
The program scans the server to identify the HBA and determine which driver to install. This scan may take a few moments.  
  
If the CD does not start automatically, access the CD-ROM drive, browse the directory of the CD, and execute the *setup.exe* file on the CD.
3. Read and accept the license agreement.
4. Click **View Readme File** to review notes and information that supplement this guide.
5. Click **Install HBA Drivers** and follow the onscreen instructions.
6. Remove the MSA1500 cs Support Software CD from the CD-ROM drive and reboot your server.
7. Repeat these procedures for each Windows server with access to the MSA1500 cs.



## Installing the ACU on your Windows management server (optional)



If you plan to use the ACU to configure the MSA1500 cs, perform the following steps to install it on the server(s) that you have designated for management tasks:

---

**Note:** In multi-path configurations, you must install the ACU on each server with access to the MSA1500 cs.

---

1. Insert the MSA1500 cs Support Software CD into the CD-ROM drive of the server and let it auto-start the installation program.
2. Read and accept the license agreement.
3. Click **Install Array Configuration Utility**.  
Follow the onscreen instructions to complete the installation.  
After the files have been copied, a completion message is displayed.
4. Click **Exit** and remove the MSA1500 cs Support Software CD from the CD-ROM drive.
5. Start the ACU and enter basic settings:
  - a. From the desktop, click **Start > Programs > HP System Tools > hp Array Configuration Utility > Set up hp Array Configuration Utility**.  
The browser-based Management Setup Wizard is opened.
  - b. Click **Next** and follow the onscreen instructions to set:
    - Administrator, Operator, and User passwords
    - Device Trust Mode
    - Remote Access
    - Execution Mode

---

**Note:** To use the ACU to configure your storage, refer to ACU online help or the *HP Array Configuration Utility User Guide*.

---

## Installing Insight Manager on your Windows servers (optional)

Insight Manager includes the following components, one or both of which can be installed on your servers:

- Central Management Server
- Management Agents

The Central Management Server is provided on the HP Management CD and is installed on the server that you have designated for management tasks. For complete installation and use instructions, use the HP Management CD or go to the Insight Manager web site at <http://www.hp.com/go/hpsim>.

The Management Agents are provided on the MSA1500 cs Support Software CD and are installed on each server that you want to monitor. These agents are accessed through either a browser or the Central Management Server.

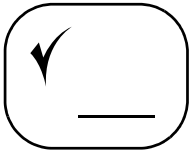
Install Insight Manager Agents on the server(s) by doing the following:

1. Insert the MSA1500 cs Support Software CD into the CD-ROM drive of the server and let it auto-start the installation program.
2. Read and accept the license agreement.
3. Click **Install Management Agents**.
4. Follow the onscreen instructions to complete the installation.

After the files have been copied, a completion message is displayed.

5. Click **Exit** and remove the MSA1500 cs Support Software CD from the CD-ROM drive.
6. Repeat [step 1](#) through [step 5](#) for each server that you want to manage with the Insight Management Agents.
7. Complete any additional configuration procedures and learn how to use the agents, as detailed in the HP Systems Insight Management Agents documentation, available on the web at <http://h18023.www1.hp.com/support/files/server/us/WebDoc/700/imaug.pdf>

## Configuring the storage



Thorough planning is critical to the successful and efficient deployment of any storage array system. As discussed in Chapter 1: [Installation Procedures - All Deployments](#), page 15, plans should include decisions about total system capacity, fault-tolerance levels (availability), and performance.

Storage configuration tasks include:

- Creating arrays (LUNs)
- Identifying the operating system of each HBA connected to the MSA1500 cs
- Entering Selective Storage Presentation (SSP) or Access Control List (ACL) settings to isolate the storage from unauthorized access

---

**Note:** In multi-path configurations:

- Verify that both HBAs in each server have been granted access to the storage.
  - Refer to the Secure Path documentation for additional configuration information.
- 

Perform these tasks using your chosen configuration utility. Refer to the appropriate user documentation for procedural instructions.

Go to [Table 12: Hard Drive Information](#), page 92 and [Table 13: Array \(LUN\) Information](#), page 96 to record information about your storage.



# Configuration Procedures - Linux Environments

## 3

Deploying the MSA1500 cs in a Linux environment involves:

1. [Completing all Prerequisites](#), page 65
2. [Installing the HBA Driver on your Linux servers](#), page 66
3. [Installing the ACU on your Linux management server \(optional\)](#), page 68
4. [Installing Insight Manager on your Linux servers \(optional\)](#), page 69
5. [Configuring the storage](#), page 71

Each of these procedures is discussed in the following paragraphs.

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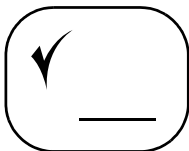
**Note:** HP recommends installing your MSA1500 cs in the sequence of steps listed here and in chapter 1 of this guide. There are specific dependencies and if you deviate from this sequence, you may have to uninstall and then reinstall your MSA1500 cs.

---

## Prerequisites

- Install and connect all equipment correctly, as detailed in “[Installation Procedures - All Deployments](#)” on page 15.  
Host computer must have the supported kernel source and kernel headers installed.
- If using the ACU, install Netscape Navigator, version 6.2 or greater or Mozilla, version 1.0.2 or greater with Personal Security Manager
- Obtain the documentation for the storage configuration tool you plan to use.  
Documentation for the ACU and the CLI are available on the MSA1500 cs Documentation CD.

## Installing the HBA Driver on your Linux servers



**Caution:** You must use the MSA1500 cs Support Software CD to install the driver for the HBA on the server. Drivers for all supported HBAs are included on the CD and are the only versions approved for use with the MSA1500 cs. Do not obtain or use an HBA driver from the HBA manufacturer or the MSA1000 web site.

---

Because this process involves updating your server configuration, HP recommends performing this task during inactive periods.

Two methods are available for loading the HBA driver, each of which is discussed in the following paragraphs:

- Using the provided RPM file (recommended)
- Compiling a driver from source code

The installed HBA driver automatically loads on each system boot and provides optimized support for single- and multi-path configurations.

### Using the provided RPM file

1. With the HBA(s) installed in the server, power on the server and start up your Linux operating system.

---

**Note:** If LUNs on the MSA1500 cs are already being presented to the server (when performing a server upgrade or move), disconnect the MSA1500 cs from the SAN. If the MSA1500 cs is unconfigured, the MSA1500 cs can be connected to the SAN.

---

2. From the console, log on as the root user.
3. Insert the MSA1500 cs Support Software CD in the CD-ROM drive of the server.
4. From the console, mount the CD-ROM drive and view the contents of the CD.
5. Locate and read the **readme.txt** file to review notes and information that supplement this guide.
6. Navigate to the */Linux* directory on the CD.

7. List the contents of the directory and identify the RPM file for your distribution of Linux.

8. Install the HBA driver on the new kernel by entering:

```
rpm -Uvh rpm filename
```

where *rpm filename* is the name of the rpm file for your distribution of Linux.

After a few minutes, the following messages are displayed:

```
Attempting to load qla2200 ..... FAILED
Attempting to load qla2300 ..... OK
```

9. For Red Hat Enterprise Linux 2.1, run the provided script to modify the SCSI blacklist.

---

**Note:**

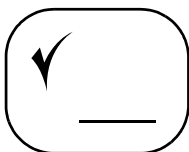
- For Red Hat Enterprise Server 3.0, do not perform [step 9](#). Proceed to [step 10](#).
  - For SuSE SLES8 / United Linux 1.0, do not perform [step 9](#). If needed, manually create and run an initrd image for your environment.
- 

- a. Navigate to the `/opt/hp/storage_drivers/qla606/Utils` directory.
  - b. List the contents of the directory and identify the `edit_initrd` file.
  - c. Enter the command `scriptname edit_initrd.XXX`  
where `xxx` is the suffix of the edit script for your distribution of Linux.
  - d. Follow the onscreen instructions to complete the update.
10. Remove the MSA1500 cs Support Software CD from the CD-ROM drive and reboot your server.
  11. Repeat these procedures for each Linux server that will access the MSA1500 cs.
  12. If it is not already connected, connect the MSA1500 cs to the SAN.

## Compiling a driver from source code

To build an HBA driver from source code or manually patch the Linux kernel, refer to the *README.XXX* file in the `/opt/hp/storage_drivers/qlaXXX/scr` directory on the Linux server, where *XXX* represents your HBA model.

## Installing the ACU on your Linux management server (optional)



To use the ACU to configure the MSA1500 cs storage, perform the following steps to install it on the server(s) that you have designated for management tasks:

---

**Note:** Previous versions of the ACU must be removed before installing newer versions.

---

1. Insert the MSA1500 cs Support Software CD in the server.
2. From the console, mount the CD-ROM drive and navigate to the */LINUX/onacu* directory on the CD.
3. List the contents of the directory and identify the ACU installation rpm file for your environment.
4. Install the ACU by entering:  

```
rpm -Uvh rpm filename
```

where *rpm filename* is the name of the ACU installation rpm file.

---

**Note:** Warning messages regarding driver version dependencies may be displayed. These messages do not affect the MSA1500 cs and may safely be ignored.

---

5. Remove the MSA1500 cs Support Software CD from the CD-ROM drive.
6. When you are ready to configure the storage, start the ACU by entering the following commands from the console:  
To enable remote access, enter: `/usr/sbin/cpqacuxe -R`  
To disable remote access, enter: `/usr/sbin/cpqacuxe -d`  
For configuration help, refer to ACU online help or the *HP Array Configuration Utility User Guide*.

---

**Note:** To use the ACU in 64-bit environments, refer to the "Scripting" chapter of the *HP Array Configuration Utility User Guide*.

---



## Installing Insight Manager on your Linux servers (optional)

Insight Manager includes the following components, one or both of which can be installed on your servers:

- Central Management Server
- Management Agents

The Central Management Server is provided on the HP Management CD and is installed on the server that you have designated for management tasks. For complete installation and use instructions, use the HP Management CD or go to the Insight Manager web site at <http://www.hp.com/go/hpsim>.

The Management Agents are provided on the MSA1500 cs Support Software CD and are installed on each server that you want to monitor. These agents are accessed through either a browser or the Central Management Server.

Install Insight Manager Agents on the server(s) by doing the following:

1. Insert the MSA1500 cs Support Software CD into the CD-ROM drive of the server.
2. From the console, mount the CD-ROM drive and navigate to the */Agents/Linux* directory on the CD.
3. List the contents of the */Agents/Linux* directory, and navigate to the sub-directory for your distribution of Linux.
4. Identify the *ucd-snmp*, *hpsasm*, and *cmastor* Insight Manager agent installation rpm files for your environment.
5. Install or upgrade the *ucd-snmp* package:

```
rpm -Uvh ucd-snmp-xxx.rpm
```

(where *xxx* completes the rpm filename for your distribution of Linux)

6. Install or upgrade the server management drivers and agents:

```
rpm -Uvh hpsasm-xxx.rpm
```

(where *xxx* completes the rpm filename for your distribution of Linux)

7. Install or upgrade the storage agent:

```
rpm -Uvh cmastor-xxx.rpm
```

(where *xxx* completes the rpm filename for your distribution of Linux)

8. Enter one of the following commands:

- If the agents are newly installed on the server and are unconfigured, enter:

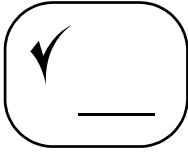
```
hpasm activate
```

- If the agents were previously installed and configured on the server and updated in [step 5](#) through [step 7](#), enter:

```
/etc/init.d/hpasm restart agents
```

9. Remove the MSA1500 cs Support Software CD from the CD-ROM drive.
10. Repeat [step 1](#) through [step 9](#) for each server that you want to manage with Insight Management Agents.
11. Complete any additional configuration procedures and learn how to use the agents, as detailed in the HP Systems Insight Management Agents documentation, available on the web at <http://h18023.www1.hp.com/support/files/server/us/WebDoc/700/Linux.pdf>

## Configuring the storage



Thorough planning is critical to the successful and efficient deployment of any storage array system. As discussed in Chapter 1: “[Installation Procedures - All Deployments](#)” on page 15, plans should include decisions about total system capacity, fault-tolerance, performance, and availability.

Storage configuration tasks include:

- Creating arrays (LUNs)
- Identifying the operating system of each HBA connected to the MSA1500 cs
- Entering Selective Storage Presentation (SSP) or Access Control List (ACL) settings to isolate the storage from unauthorized access

---

**Note:** In multi-path configurations:

- Verify that both HBAs in each server have been granted access to the storage.
  - Refer to the Secure Path documentation for additional configuration information.
- 

Perform these tasks using your chosen configuration utility. Refer to the appropriate user documentation for procedural instructions.

Go to [Table 12: “Hard Drive Information”](#) on page 92 and [Table 13: “Array \(LUN\) Information”](#) on page 96 to record information about your LUNs.



# Configuration Procedures - NetWare Environments

## 4

Deploying the MSA1500 cs in a NetWare environment involves:

1. [Completing all Prerequisites](#), page 73
2. [Installing the HBA Driver on your NetWare servers](#), page 74
3. [Installing Insight Manager on your NetWare servers \(optional\)](#), page 75
4. [Configuring the storage](#), page 76

These procedures are discussed in the following paragraphs.

---

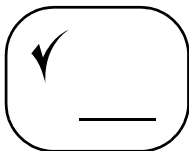
**Note:** HP recommends installing your MSA1500 cs in the sequence of steps listed here and in chapter 1 of this guide. There are specific dependencies and if you deviate from this sequence, you may have to uninstall and then reinstall your MSA1500 cs.

---

## Prerequisites

- Install and connect all equipment correctly, as detailed in “[Installation Procedures - All Deployments](#)” on page 15.
- Obtain the documentation for the storage configuration tool you plan to use. Documentation for the ACU and the CLI are available on the MSA1500 cs Documentation CD.

## Installing the HBA Driver on your NetWare servers



**Caution:** You must use the MSA1500 cs Support Software CD to install the driver for the HBA on the server. Drivers for all supported HBAs are included on the CD and are the only versions approved for use with the MSA1500 cs. Do not obtain or use an HBA driver from the HBA manufacturer or the MSA1000 web site.

---

1. Install the HBA(s), power on the server, and start your NetWare operating system.
2. Insert the MSA1500 cs Support Software CD into the CD-ROM drive.
3. From the system console, mount the CD-ROM drive and enter the following:  
`HPSSCDxxx:\netware\hpsetup.nlm`  
(HPSSCDxxx is the label of the MSA1500 cs Support Software CD.)  
The driver installation screen is displayed.
4. Follow the onscreen instructions to complete the driver installation.
5. After the driver is installed, load the NWCONFIG utility by entering:  
`NWCONFIG`  
In the Configuration Options screen, select **NCF files Options**. Press **Enter**.
6. Select **Edit STARTUP.NCF file** and press **Enter**.
7. At **Specify a server boot path:** enter the path.  
The default path is `C:\NWSERVER`.
8. Enter the following Load command for each HBA, using the appropriate slot number to indicate where the HBAs are inserted in the server:  
`LOAD QL2300.HAM SLOT = xx /LUNS /ALLPATHS /PORTNAMES`  
(xx represents the slot number.)
9. Press **F10** to save these changes and then return through all previous menus.
10. Remove the MSA1500 cs Support Software CD from the CD-ROM drive and restart your NetWare server to load the new drivers.
11. Repeat these procedures for each NetWare server with access to the MSA1500 cs.

## Installing Insight Manager on your NetWare servers (optional)

Insight Manager includes the following components, one or both of which can be installed on your servers:

- Central Management Server
- Management Agents

The Central Management Server is provided on the HP Management CD and is installed on the server that you have designated for management tasks. For complete installation and use instructions, use the HP Management CD or go to the Insight Manager web site at <http://www.hp.com/go/hpsim>.

---

**Note:** The SIM Central Management Server that is installed from the HP Management CD must be installed on a Windows server in the same network as the NetWare server. It is not installed on the NetWare server.

---

The Management Agents are provided on the MSA1500 cs Support Software CD and are installed on each server that you want to monitor. These agents are accessed through either a browser or the Central Management Server.

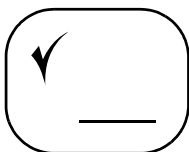
Install Insight Management Agents on the server(s) by doing the following:

1. Insert the MSA1500 cs Support Software CD into the CD-ROM drive of the NetWare server.
2. From the system console, mount the CD-ROM drive and enter the following:  

```
HPSSCDxxx:\Agents\NetWare\cpqdpoly.nlm
```

  
(HPSSCDxxx is the volume label of the MSA1500 cs Support Software CD.)  
The HP ProLiant Component Installer screen is displayed.
3. Follow the onscreen instructions to complete the component installation.
4. Remove the MSA1500 cs Support Software CD from the CD-ROM drive.
5. Repeat step [step 1](#) through [step 4](#) on each NetWare server that you want to manage through the Insight Management Agents.
6. Complete any additional configuration procedures and learn how to use the agents, as detailed in the HP Systems Insight Management Agents documentation, available on the web at <http://h18023.www1.hp.com/support/files/server/us/WebDoc/700/AGNETW.PDF>

## Configuring the storage



Thorough planning is critical to the successful and efficient deployment of any storage array system. As discussed in Chapter 1: “[Installation Procedures - All Deployments](#)” on page 15, plans should include decisions about total system capacity, fault-tolerance, performance, and availability.

Storage configuration tasks include:

- Creating arrays (LUNs)
- Identifying the operating system of each HBA connected to the MSA1500 cs
- Entering Selective Storage Presentation (SSP) or Access Control List (ACL) settings to isolate the storage from unauthorized access

---

**Note:** In multi-path configurations:

- Verify that both HBAs in each server have been granted access to the storage.
  - Refer to the Secure Path documentation for additional configuration information.
- 

Perform these tasks using your chosen configuration utility. Refer to the appropriate user documentation for procedural instructions.

---

**Note:** If you plan to use the ACU to configure your storage, you must boot from the MSA1500 cs Support Software CD and execute the ACU from the CD.

---

Go to [Table 12: “Hard Drive Information”](#) on page 92 and [Table 13: “Array \(LUN\) Information”](#) on page 96 to record information about your storage.



# Regulatory Notices



## Regulatory Compliance identification numbers

For the purpose of regulatory compliance certifications and identification, your HP StorageWorks Modular Smart Array 1500 cs is assigned an HP Series number. The Series number can be found on the product label, along with the required approval markings and information. The product label is located on the right side of the chassis. When requesting certification information for this product, always refer to this Series number. This Series number should not be confused with the marketing name or model number for your storage system.

## Federal Communications Commission notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause harmful interference, in which case the user must correct the interference at personal expense.

## Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may void the user's authority to operate the equipment.

## Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to comply with FCC Rules and Regulations.

## Canadian notice (Avis Canadien)

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

## European Union notice

Products with the CE Marking comply with both the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European Norms (in brackets are the equivalent international standards):

- EN55022 (CISPR 22) - Electromagnetic Interference
- EN50082-1 (IEC801-2, IEC801-3, IEC801-4) - Electromagnetic Immunity
- EN60950 (IEC950) - Product Safety

## Japanese notice

ご使用になっている装置にVCCIマークが付いていましたら、次の説明文をお読み下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。

VCCIマークが付いていない場合には、次の点にご注意下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

## Japanese power cord notice

製品には、同梱された電源コードをお使い下さい。  
同梱された電源コードは、他の製品では使用出来ません。

## BSMI notice

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

## Laser compliance

The SFP Module contains a laser diode of either gallium aluminum arsenide (GaALAs) emitting in the wavelength range of 770-860 nm, or indium gallium arsenide phosphide (InGaAsP) emitting in the wavelength range of 1270-1355 nm. All HP systems equipped with a laser device comply with safety standards, including International Electrotechnical Commission (IEC) 825. With specific regard to the laser, the equipment complies with laser product performance standards set by government agencies as a Class 1 laser product. The product does not emit hazardous laser radiation.



**WARNING:** Use of controls or adjustments or performance of procedures other than those specified herein or in the laser product's installation guide may result in hazardous radiation exposure. To reduce the risk of exposure to hazardous radiation:

- Do not try to open the unit enclosure. There are no user-serviceable components inside.
  - Do not operate controls, make adjustments, or perform procedures to the laser device other than those specified herein.
  - Allow only HP Authorized Service technicians to repair the unit.
-

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States. This device is classified as a Class 1 laser product as defined by IEC 825.



This indicates that the product is classified as a CLASS 1 LASER PRODUCT.

## Battery replacement notice

Your MSA1500 cs is provided with a Lithium Manganese Dioxide, a Nickel-Metal Hydride, or a Vanadium Pentoxide, batteries. There is a danger of explosion and risk of personal injury if the array is incorrectly replaced or mistreated. Replace only with the HP spare designated for this product. For more information about battery replacement or proper disposal, contact your HP Authorized Reseller or your Authorized Service Provider.



**WARNING:** Your Accelerator Array contains Lithium Manganese Dioxide, Nickel-Metal Hydride, or Vanadium Pentoxide batteries. There is risk of fire and burns if the battery pack is not handled properly. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
- Do not expose to temperatures higher than 60° C (140° F).
- Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
- Replace only with HP spare designated for this product.



**Caution:** Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. In order to forward them to recycling or proper disposal, please use the public collection system or return them to HP, your authorized HP Partners, or their agents.





# Electrostatic Discharge

B

To prevent damage to the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

## Prevention methods

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always make sure you are properly grounded when touching a static-sensitive component or assembly.

## Grounding methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm  $\pm$  10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the equipment suggested for proper grounding, either have an HP Authorized Reseller install the part or discharge any potential static by touching a piece of sheet metal immediately before touching the component or the MSA1500 cs.

---

**Note:** For more information on static electricity, or assistance with product installation, contact your HP Authorized Reseller.

---



# MSA1500 cs Worksheets



Use these worksheets to record information about your MSA1500 cs.

---

**Note:** Although these worksheets are not prerequisites for installing your MSA1500 cs, some of the information is required for multi-pathing, future configuration changes, and troubleshooting purposes.

---

The following worksheets are included in this section:

- [MSA1500 cs Information](#), page 86
- [External Fibre Channel Interconnect Device \(Switch\) Information](#), page 87
- [Server Information](#), page 88
- [Hard Drive Information](#), page 92
- [Array \(LUN\) Information](#), page 96

**Table 9: MSA1500 cs Information**

Component	Setting
<b>Configuration Type</b> (check one)	<input type="checkbox"/> Single-path, non-clustered <input type="checkbox"/> Single-path, clustered-servers <input type="checkbox"/> Multi-path, non-clustered <input type="checkbox"/> Multi-path, multiple clustered-servers
<b>MSA1500 cs</b>  Serial number (on the product label) Controller firmware: Version shipped on the controller Version available on the Web Support Software CD: Version shipped with the MSA1500 cs Version available on the Web MSA1500 cs WWNN MSA1500 cs WWPNN  Fibre Channel interconnect device (switch)  Additional SCSI I/O module, in bus 1 slot Additional SCSI I/O module, in bus 2 slot Additional SCSI I/O module, in bus 3 slot  <i><b>Additional items for multi-path configurations:</b></i> Redundant Controller Redundant Fibre Channel I/O Module Redundant switch (must be the same as the primary)	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <p>(See <a href="#">Table 10 External Fibre Channel Interconnect Device (Switch) Information</a>)</p> <input type="checkbox"/> Yes <input type="checkbox"/> Yes <input type="checkbox"/> Yes  <input type="checkbox"/> Yes <input type="checkbox"/> Yes <input type="checkbox"/> Yes

**Table 10: External Fibre Channel Interconnect Device (Switch) Information**

Component	Setting
<b>Primary Switch</b> Make and model Switch firmware version Switch IP Address Switch WWNN Switch WWPN  <b>Additional Device for Multi-Path Configurations:</b> Make and model Switch firmware version Switch IP Address Switch WWNN Switch WWPN	          <u>(must be the same as the companion device)</u> <u>(must be the same as the companion device)</u>    
<b>Any Other Interconnect Device</b> Make and model Switch firmware version Switch IP Address Switch WWNN Switch WWPN	     
<b>Any Other Interconnect Device</b> Make and model Switch firmware version Switch IP Address Switch WWNN Switch WWPN	     

**Table 11: Server Information**

Component	Setting
<b>Primary Server</b>	
Make and model	_____
Operating system and version / kernel	_____
Service pack / Errata	_____
Server name	_____
HBA model	_____
HBA server slot location	_____
HBA firmware version	_____
HBA driver version	_____
HBA boot BIOS firmware	_____
HBA WWNN	_____
HBA WWPNN (also called Adapter ID)	_____
<b><i>Additional Items for Multi-Path Configurations:</i></b>	
Multi-pathing software and version	_____
Redundant HBA model	<u>(must be the same as the companion HBA)</u>
Redundant HBA server slot location	_____
Redundant HBA WWNN	_____
Redundant HBA WWPNN	_____
<b><i>Additional Items for Clustered Configurations:</i></b>	
Clustering software and version	_____
Cluster cabling	_____
<p><b>Note:</b> Worksheets for four (4) servers are provided in this table.</p> <ul style="list-style-type: none"> <li>■ Complete one worksheet for each server connected to your MSA1500 cs.</li> <li>■ If necessary, create additional copies of this worksheet.</li> </ul>	

Table 11: Server Information

Component	Setting
<b>Additional Server</b>	
Make and model	
Operating system and version / kernel	
Service pack / Errata	
Server name	
HBA model	
HBA server slot location	
HBA firmware version	
HBA driver version	
HBA boot BIOS firmware	
HBA WWNN	
HBA WWPN (also called Adapter ID):	
<b><i>Additional Items for Multi-Path Configurations:</i></b>	
Multi-pathing software and version	
Redundant HBA model	<u>(must be the same as the companion device)</u>
Redundant HBA server slot location	
Redundant HBA WWNN	
Redundant HBA WWPN	
<b><i>Additional Items for Clustered Configurations:</i></b>	
Clustering software and version	
Cluster cabling	

**Table 11: Server Information**

Component	Setting
<b>Additional Server</b>	
Make and model	_____
Operating system and version / kernel	_____
Service pack / Errata	_____
Server name	_____
HBA model	_____
HBA server slot location	_____
HBA firmware version	_____
HBA driver version	_____
HBA boot BIOS firmware	_____
HBA WWNN	_____
HBA WWPN (also called Adapter ID)	_____
 <b><i>Additional Items for Multi-Path Configurations:</i></b>	
Multi-pathing software and version	_____
Redundant HBA model	<u>(must be the same as the companion device)</u>
Redundant HBA server slot location	_____
Redundant HBA WWNN	_____
Redundant HBA WWPN	_____
 <b><i>Additional Items for Clustered Configurations:</i></b>	
Clustering software and version	_____
Cluster cabling	_____

Table 11: Server Information

Component	Setting
<b>Additional Server</b>	
Make and model	
Operating system and version / kernel	
Service pack / Errata	
Server name	
HBA model	
HBA server slot location	
HBA firmware version	
HBA driver version	
HBA boot BIOS firmware	
HBA WWNN	
HBA WWPN (also called Adapter ID)	
<b><i>Additional Items for Multi-Path Configurations:</i></b>	
Multi-pathing software and version	
Redundant HBA model	<u>(must be the same as the companion device)</u>
Redundant HBA server slot location	
Redundant HBA WWNN	
Redundant HBA WWPN	
<b><i>Additional Items for Clustered Configurations:</i></b>	
Clustering software and version	
Cluster cabling	

**Table 12: Hard Drive Information**

Box Number	Drive Bay	Transfer Rate	Drive Capacity	Spindle Speed		Array Letter (LUN #)
Box Number Assigned to this Enclosure  _____	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
	11					
	12					
	13					
	14					

**Note:** Recording information about the hard drives and their configuration is a two-step process:

- As you install the hard drives, record basic information about the drives in this table.
- As you configure the storage, enter the array letter (LUN #) of the drive in this table and record information about the arrays (LUNs) in [Table 13 "Array \(LUN\) Information"](#) on page 96.

**Note:** Worksheets for four (4) storage enclosures are included in this table.

- Complete one worksheet for each storage enclosure connected to your MSA1500 cs.
- If necessary, create additional copies of this worksheet.



**Table 12: Hard Drive Information**

Box Number	Drive Bay	Transfer Rate	Drive Capacity	Spindle Speed		Array Letter (LUN #)
Box Number Assigned to this Enclosure  _____	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
	11					
	12					
	13					
	14					
<p><b>Note:</b> Box numbers are assigned to enclosures based on their connection to the MSA1500 cs. See <a href="#">Figure 11 “SCSI I/O modules, bus numbers, and box numbers”</a> on page 40 for the box number assignment pattern.</p>						

**Table 12: Hard Drive Information**

Box Number	Drive Bay	Transfer Rate	Drive Capacity	Spindle Speed		Array Letter (LUN #)
Box Number Assigned to this Enclosure  _____	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
	11					
	12					
	13					
	14					

Table 12: Hard Drive Information

Box Number	Drive Bay	Transfer Rate	Drive Capacity	Spindle Speed		Array Letter (LUN #)
Box Number Assigned to this Enclosure  _____	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
	11					
	12					
	13					
	14					

### Table 13: Array (LUN) Information

[illegible]

### Table 13: Array (LUN) Information

[illegible]

### Table 13: Array (LUN) Information

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